## [o-1-1] Future Space Transportation System (1)

<table>
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<tr>
<th>Session Date</th>
<th>July 9 (Thurs) 9:00 – 10:40</th>
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<tbody>
<tr>
<td>Room</td>
<td>Kobe International Conference Center, Meeting Room 401</td>
</tr>
<tr>
<td>Chairpersons</td>
<td>Kenji Fujii (JAXA, Japan)</td>
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<td>Tetsuhiko Kozasa (Mitsubishi Heavy Industries Ltd., Japan)</td>
</tr>
</tbody>
</table>

### 2015-o-1-01 ( 9:00 - 9:25 )

**Design Study and Technology Development for Future Reusable Space Vehicles**

Shinji Ishimoto, Koichi Okita  
Japan Aerospace Exploration Agency (JAXA), Japan

### 2015-o-1-02 ( 9:25 - 9:50 )

**Rocket Engine Feasibility Study for the JAXA Future Transportation Reference System**

Asuka Iijima1, Daisuke Nakata1, Kazuyuki Higashino1, Nobuhiro Tanatsugu1, Shinji Ishimoto2, Nobuyuki Azuma2  
1Aerospace Plane Research Center, Muroran Institute of Technology, Japan, 2Japan Aerospace Exploration Agency, Japan

### 2015-o-1-03 ( 9:50 - 10:15 )

**Preliminary Design of Winged Rocket Test Vehicle with Liquid Methane Propulsion System**

Guna Surendra Gossamsetti1, Koichi Yonemoto1, Hiroshi Yamasaki1, Ahsan R. Choudhuri2, Shinji Ishimoto3, Takashi Mugitani3  
1Kyushu Institute of Technology, Japan, 2University of Texas at El Paso (UTEP), USA, 3Japan Aerospace Exploration Agency (JAXA), Japan

### 2015-o-1-04 ( 10:15 - 10:40 )

**Flight Test Results of Small Winged Rocket WIRES#014 for Evaluation of Guidance and Control**

Takaaki Matsumoto1, Koichi Yonemoto1, Hiroshi Yamasaki1, Masatomo Ichige1, Guna Surendra Gossamsetti1, Gaku Sasaki1, Yusuke Ura1, Shinji Ishimoto2, Takashi Mugitani2, Shuji Ogawa3  
1Kyushu Institute of Technology, Japan, 2Japan Aerospace Exploration Agency (JAXA), Japan, 3PD Aerospace Ltd., Japan

## [o-1-2] Future Space Transportation System (2)

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### 2015-o-1-05 ( 11:00 - 11:25 )

**System Analysis of a TSTO Reusable Launch Vehicle with Ethanol-Fueled RBCC Engines**

Takahiro Fujikawa1, Daisuke Kanameda1, Takeshi Tsuchiya1, Sadatake Tomioka2  
1The University of Tokyo, Japan, 2JAXA, Japan

### 2015-o-1-06 ( 11:25 - 11:50 )

**Optimization on Hydrocarbon-fueled RBCC Engines for a TSTO Launch Vehicle**

S. Tomioka, K. Kobayashi, T. Saito, K. Kato, M. Kodera, K. Tani  
Japan Aerospace Exploration Agency, Japan

### 2015-o-1-07 ( 11:50 - 12:15 )

**Analysis of the Mixing Effect to the Ejector Performance**

Kouichi Tani1, Susumu Haegawa1, Syuichi Ueda1, Takeshi Kanda1, Harunori Nagata2  
1Japan Aerospace Exploration Agency, Japan, 2Hokkaido University, Japan
## [o-1-3] Future Space Transportation System (3)

<table>
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<th>Session Date</th>
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<td>Wataru Sarae (JAXA, Japan)</td>
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<td>Takaaki Matsumoto (Kyushu Institute of Technology, Japan)</td>
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</table>

- **2015-o-1-08 ( 14:00 - 14:25 )**
  - Development of the Low-Cost LOX/Ethanol Sounding Rocket System
  - Ryuichiro Kanai\(^1\), Takahiro Inagawa\(^1\), Atsushi Noda\(^2\)
    - \(^1\)Interstellar Technologies Inc., Japan, \(^2\)Independent Space Craft Engineer, Japan

- **2015-o-1-09 ( 14:25 - 14:50 )**
  - Conceptual Study on Hydrogen-Based Integration of Propulsion and Power in Space Transportation System
  - Yusuke Maru\(^1\), Yoshiaki Nakaue\(^2\), Yoshihumi Inatani\(^3\), Hatsuo Moni\(^3\)
    - \(^1\)JAXA, Japan, \(^2\)The University of Tokyo, Japan, \(^3\)IHI Corporation, Japan

- **2015-o-1-10 ( 14:50 - 15:15 )**
  - USV3: An Autonomous Re-Entry System for Aerospace Technology Development
  - M. De Stefano Fumo, L. Vecchione
    - Italian Aerospace Research Centre (CIRA), Italy

- **2015-o-1-11 ( 15:15 - 15:40 )**
  - Feasibility Study on Advanced Morphing Space Transportation System with Concept for Wider Cross Range and Down Range
  - Shigeru Aso, Yasuhiro Tani
    - Kyushu University, Japan

## [o-2-1] Launch Vehicle Acoustics (1)

<table>
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<tr>
<td>Chairpersons</td>
<td>Kent L. Gee (Brigham Young University, USA)</td>
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<td>Seiji Tsutsumi (JAXA, Japan)</td>
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</table>

- **2015-o-2-01 ( 9:00 - 9:20 )**
  - ADEL Research Group
    - Amaya Espinosa Ramos\(^1\), Aurelie Bornes\(^2\)
      - \(^1\)CNES, France, \(^2\)Airbus DS, France

- **2015-o-2-02 ( 9:20 - 9:40 )**
  - Suppression of Liftoff Acoustic of H-IIA Launch Vehicle by Water Injection
    - Hiroshi Ikaida, Keita Terashima, Seiji Tsutsumi, Taro Shimizu, Toru Kamita
      - Japan Aerospace Exploration Agency, Japan

- **2015-o-2-03 ( 9:40 - 10:00 )**
  - Studies on Satellites Acoustic Environment on Board of Solid Propelled Rockets: Experience from Flight Heritage and Benefits for Missions Preparation
    - M. Castelli, D. Barbagallo
      - ESA-ESRIN, Italy

- **2015-o-2-04 ( 10:00 - 10:20 )**
  - Acoustic Characterization of Jet Interaction with Launch Structures during Lift-Off
    - N Karthikeyan, L Venkatakrishnan
      - CSR-National Aerospace Laboratories, India

- **2015-o-2-05 ( 10:20 - 10:40 )**
  - Numerical Aeroacoustics Analysis of a Scaled Solid Jet Impinging on Flat Plate with Exhaust Hole
    - Seiji Tsutsumi, Ryoji Takaki, Hiroshi Ikaida, Keita Terashima
      - JAXA, Japan
## [o-2-2] Launch Vehicle Acoustics (2)

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</table>

2015-o-2-06 (11:00 - 11:20)

**Conditional Sampling Analysis of Acoustic Phenomena from Supersonic Jet Impinging on Inclined Flat Plate**

Masahito Akamine¹, Koji Okamoto¹, Susumu Teramoto¹, Takeo Okunuki¹, Seiji Tsutsumi²

¹The University of Tokyo, Japan, ²JAXA, Japan

2015-o-2-07 (11:20 - 11:40)

**Study of Impinging Supersonic Jet Noise with Aerodynamic and Acoustic Numerical Simulations**

Julien Troyes¹, François Vuillot¹, Hadrien Lambare², Amaya Espinosa Ramos²

¹Onera, France, ²CNES, France

2015-o-2-08 (11:40 - 12:00)

**Comparative Analysis of NASA SP-8072’s Core Length with Full-Scale Rocket Data**

Michael M. James¹, Alexandria R. Salton¹, Kent L. Gee², Tracianne B. Neilsen²

¹Blue Ridge Research and Consulting, USA, ²Brigham Young University, USA

2015-o-2-10 (12:00 - 12:20)

**Modeling of Rocket Noise Propagation: the Generalized Burgers Equation and Beyond**

Taeyoung Park¹, Hunki Lee¹, Jae-Wan Lee², Won-Suk Ohm³, Dohyung Lee³

¹Yonsei University, Korea, ²Agency for Defense Development, Korea

2015-o-2-11 (12:20 - 12:40)

**Analysis of the Effects of Finite Impedance Ground and Atmospheric Turbulence on Launch Vehicle Noise Measurements**

Tracianne B. Neilsen¹, Kent L. Gee¹, Samuel M. Hord¹, Michael M. James²

¹Brigham Young University, USA, ²Blue Ridge Research and Consulting, USA

## [o-2-3] Launch Vehicle Acoustics (3)

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<td>Michael M James (Blue Ridge Research and Consulting, LLC, USA)</td>
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2015-o-2-12 (15:00 - 15:20)

**Development of a Near-Field Intensity Measurement Capability for Static Rocket Firings**

Kent L. Gee¹, Tracianne B. Neilsen¹, Eric B. Whiting¹, Michael M. James², Alexandra R. Salton²

¹Brigham Young University, USA, ²Blue Ridge Research and Consulting, USA

2015-o-2-13 (15:20 - 15:40)

**Large Eddy Simulation of Rocket Plume Acoustics using High Order Unstructured Grid Method**

Takanori Haga¹, Seiji Tsutsumi¹, Soshi Kawai², Ryoji Takaki³

¹JAXA/JEDI, Japan, ²Tohoku University, Japan, ³JAXA/JAXA, Japan

2015-o-2-14 (15:40 - 16:00)

**Computational Analysis of Compressible Gas-Particle-Multiple Turbulent Mixing Layer in Euler-Euler Formulation**

Daiki Terakado¹, Yuki Nagata², Taku Nonomura³, Kozo Fuji³, Makoto Yamamoto²

¹The University of Tokyo, Japan, ²Tokyo University of Science, Japan, ³JAXA/JAXA, Japan

2015-o-2-16 (16:00 - 16:20)

**Evaluation on Launch Vehicle Acoustics during Transonic Flight Regime Based on Flight Data**

Hiroki Ashida¹, Nobuhiko Ohtsubo³, Hiroshi Ikaida², Keita Terashima²

¹Mitsubishi Heavy Industries, Japan, ²JAXA, Japan

2015-o-2-17 (16:20 - 16:40)

**Experimental and Computational Study on Sound Transmission of Planar Sound Waves through a Double-Leaf Panels**
[o-3] Next Flagship Launch System

Session Date: July 8 (Wed) 17:00 – 18:15
Room: Kobe International Conference Center, Meeting Room 401
Chairpersons:
Nobuyuki Tsuboi (University of Kyushu, Institute of Technology, Japan)
Takeshi Tsujimoto (JAXA, Japan)

2015-o-3-01 (17:00 - 17:25)
Development Purposes and Concept of Next Flagship Launch System, H-X
Daizo Sugimori1, Atsushi Saito1, Shigeru Mori1, Shintaro Nishihara1, Makoto Arita1, Masashi Okada1, Tatsuya Komaru2, Akhiro Satz2, Takanobu Kamiya2, Mayuki Niitsu2
1Japan Aerospace eXploration Agency, Japan, 2Mitsubishi Heavy Industry, Japan

2015-o-3-03 (17:25 - 17:50)
Development of Solid Rocket Booster for Next Flagship Launch System
Eiichi Wada1, Makoto Arita1, Toru Nagao2, Yoko Nakagawa2, Hirotaka Uehara2, Syunsuke Watabe2, Masanori Sakaino2, Ryo Masumoto2
1JAXA, Japan, 2IHI AEROSPACE Co., Ltd.

2015-o-3-04 (17:50 - 18:15)
Ground Systems and Operations of Next Flagship Launch System, H-X
Wataru Sarae, Hiroyuki Ueda, Akito Hattori, Hiroyuki Nagata
Japan Aerospace exploration Agency, Japan

[o-4-1] Remote Sensing & Geographical Information System (1)

Session Date: July 8 (Wed) 9:00 – 10:20
Room: Kobe International Conference Center, Meeting Room 504
Chairpersons:
Toshiro Sugimura (Nihon University, Japan)
Takeo Tadono (JAXA, Japan)

2015-o-4-01 (9:00 - 9:20)
Research on Moderate-Resolution Earth Observation Data at AIST
Toshiaki Iwata, Ryosuke Nakamura, Toru Koyama, Soushi Kato, Kumiko Machita (AIST)
National Institute of Advanced Industrial Science and Technology, Japan

2015-o-4-02 (9:20 - 9:40)
Observation of Nishinoshima by Landsat-8 and FORMOSAT-2
Toshiro Sugimura, Atsushi Ono
Remote Sensing Technology Center of Japan

2015-o-4-03 (9:40 - 10:00)
Urbanization and Disaster at the Tokyo Metropolitan Area by Satellite Images and Old Maps
Toshiro Sugimura1, Kuniaki Isobe2
1Nihon University, Japan, 2Asia Air Survey Co., Ltd., Japan

2015-o-4-04 (10:00 - 10:20)
Tradeoff Studies on Total Serviceability Evaluation for Disaster Monitoring by Satellites
Taichi Nakamura
Mitsubishi Electric Corporation, Japan

[o-4-2] Remote Sensing & Geographical Information System (2)

Session Date: July 8 (Wed) 11:00 – 12:40
Room: Kobe International Conference Center, Meeting Room 504
2015-o-4-06 (11:00 - 11:20)

Status of Precise Global 3D Map "ALOS World 3D (AW3D)"
Takeo Tadono, Fumiko Oda, Hiroto Nagai, Haruyuki Ishida, Hirofumi Iwamoto
JAXA, Japan

2015-o-4-07 (11:20 - 11:40)

Environmental Restoration of Old Juyan Lake Area Based on the Investigation of Micro-Topography by Satellite Data
Yasunori Nakayama1, Kunihiko Endo1, Guijin Mu2, Yoshiaki Furuno3
1Nihon University, Japan, 2CAS, China, 3SED, Japan

2015-o-4-08 (11:40 - 12:00)

A 20-Year History of Glacial Lakes in the Bhutan Himalaya (Analysed from the ALOS-Based Integrated Glacier-Glacial Lake Inventory)
Hiroto Nagai1, Jinjo Ukiya2, Takeo Tadono1, Chiyuki Narama2, Tsutomu Yamanokuchi2, Nobuhiro Tomiyama2, Akiko Sakai4, Koji Fujita4
1JAXA, Japan, 2Niigata University, Japan, 3RESTEC, Japan, 4Nagoya University, Japan

2015-o-4-09 (12:00 - 12:20)

Spatial-Temporal Epidemiology of the Dengue Outbreak in the Northern Region of Sri Lanka, 2010-2013
Sumiko Anno1, Keiji Imaoka2, Takeo Tadono2, Tamotsu Igashiri3, Subramaniam Sivaganesh4, Selvam Kannathasan5, Valthehi Kumaran5, Sinnathamy Noble Surendran5
1Shibaura Institute of Technology, Japan, 2JAXA, Japan, 3RESTEC, Japan, 4Regional Epidemiologist, Sri Lanka, 5University of Jaffna, Sri Lanka

2015-o-5-01 (14:00 - 14:25)

Making Story of the Mono-zukuri as Socio-Cultural Discourse of Space Industry in Japan
Hirofumi Iwatani
National Museum of Ethnology, Japan

2015-o-5-02 (14:25 - 14:50)

The Japanese Imagination of Space and Audio-Visual Media
Fumiaki Itakura
Kobe University, Japan

2015-o-5-04 (14:50 - 15:15)

Socio-Cultural Problems of Space Tourism -From Cultural Anthropological View-
Hiroki Okada
Kobe University, Japan

2015-o-5-05 (16:00 - 16:25)

 Applied Remote Sensing Research: Global AIS on Space Station
Robert Carlson1, Martin Tschirschwitz1, Kevin Jackson2, David Jarvis1
1JAMSS America, Inc., USA, 2Flexitech LLC, USA

2015-o-5-06 (16:25 - 16:45)

Socio-cultural Approaches for Space Exploration (2)

Session Date: July 9 (Thurs) 16:00 – 17:15
Room: Kobe International Conference Center, Meeting Room 503
Chairpersons: Keiichi Omura (Osaka University, Japan), Tomohisa Sato (Kyoto Bunkyo University, Japan)
### [o-6-1] Space Port (1)

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<td>Charles J. Lauer (Rocketplane Global, USA)</td>
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#### 2015-o-6-11 (9:00 - 9:20)

**Optimising the Potential Location of Spaceport Australia Based on Current Suborbital Space Tourism Requirements**

Graham Wild, Glenn Baxter, Hideaki Ogawa, Rano Jonquille

*RMIT University, Australia*

#### 2015-o-6-02 (9:20 - 9:40)

**Future design of the Hokkaido space flight center**

Kenichi Ito, Ryojiro Akiba, Kuninori Uesugi

*Hokkaido Aerospace Science and Technology Incubation Center (HASTIC), Japan*

#### 2015-o-6-03 (9:40 - 10:00)

**Reunion Spaceport**

Guy Pignon1, Willy LAMEYER2, Peter MERTES3

1École Polytechnique, France, 2Reunion Island Space Initiative, Reunion Island, 3Pardon International, Reunion Island

#### 2015-o-6-04 (10:00 - 10:20)

**ALSET Program Overview**

Yuichi Noguchi

*IHI AEROSPACE Co., Ltd, Japan*

#### 2015-o-6-05 (10:20 - 10:40)

**A Plan in a Multitask Cube-sat Observation System Utilizing a Cloud Computing**

Daisuke Sekiguchi1, Kazuki Watanabe1,2

1Space Land Research Association (SLA), Japan, 2WEL Research Co. Ltd., Japan

### [o-6-2] Space Port (2)

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<td>Misuzu Onuki (Space Frontier Foundation, Asia)</td>
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#### 2015-o-6-06 (11:00 - 11:20)

**Commercial Spaceports - The Emerging Hubs for Space Enterprise**

Misuzu Onuki

*Space Frontier Foundation*

#### 2015-o-6-07 (11:20 - 11:40)

**Virgin Galactic & Spaceport America and my thoughts**
### Technical Session Oral

#### [a-1] Solid Rocket (1)

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<td>Hiroyuki Yamaguchi (JAXA, Japan)</td>
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#### 2015-a-01 ( 9:00 - 9:20 )

**One-Dimensional Unsteady Internal Ballistics Modeling**

C. H. Chiang  
I-Shou University, Taiwan

#### 2015-a-02 ( 9:20 - 9:40 )

**Analysis of Large Solid Rocket Motor Static Firing Tests**

Amareshwara Sainadh Ch, Jeenu R, Jayaprakash J, Somanath S  
Vikram Sarabhai Space Centre, India

#### 2015-a-03 ( 9:40 - 10:00 )

**The Continuous Mixing Process of Composite Solid Propellant Slurry by the Artificial Muscle Actuator**

Akihiro Iwasaki1, Ryosuke Ban2, Shun Yoshihama2, Taro Nakamura2, Hiroto Habu3  
1The Gradudate University for Advanced Studies (SOKENDAI), Japan, 2Chuo University, Japan, 3JAXA, Japan

#### 2015-a-04 ( 10:00 - 10:20 )

**Evaluation of Particle Damping Characteristics of Solid Rocket Motor by the P/VACV Burner**

Yousuke Sasayama, Kengo Yamamoto, Apollo B. Fukuchi  
IHI AEROSPACE Co., Ltd., Japan

#### 2015-a-05 ( 10:20 - 10:40 )

**Thrust Increase of a Micro-Solid Rocket using a Stack of B/KNO3 Pellets**

Jun Asakawa  
The University of Tokyo, Japan

#### [a-2] Solid Rocket (2)

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<td>Akira Kakami (University of Miyazaki, Japan)</td>
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Condensed Phase Decomposition Mechanism of Ammonium Dinitramide
Yu-ichiro Izato1, Hiroto Habu2, Mitsuo Koshi1, Atsumi Miyake1
1Yokohama National University, Japan, 2Japan Aerospace Exploration Agency (JAXA), Japan

Development of Aluminum-Hydrogen Peroxide Propulsion using Nano/Micron Aluminium Particles
Ming-Te Chen, Hung-Wei Hsu, Yao-Chung Hsu, Yei-Chin Chao
National Cheng Kung University, Taiwan

Performance Evaluation of a Throttleable Solid Propellant Thruster using Laser Heating
Shota Isakari, Shingo Onizuka, Yasuyuki Yano, Akira Kakami
University of Miyazaki, Japan

Chemical Augmentation of Laser Ablation Impulses through Laser-Ablation Plasma and Air Interaction
Souto Komine, Yuki Toshima, Yuki Mutoh, Takumi Oyama, Hideyuki Horisawa
Tokai University, Japan

[ SESSION ] Hybrid Rocket (1)

Session Date        July 7 (Tue) 15:00 – 16:40
Room                Kobe International Conference Center, Meeting Room 403
Chairpersons        Daisuke Nakata (Muroran Institute of Technology, Japan)
                    Kengo Yamamoto (IHI Aerospace, Japan)

Development of Wall Regression Model of Hybrid Rocket Solid Fuels
Kazuya Nawata, Shunya Sasaki, Tatsuya Saito, Nobuyuki Oshima, Masashi Wakita, Tsuyoshi Totani, Harunori Nagata
Hokkaido University, Japan

Feedback Model for Thrust and O/F Control of Altering-Intensity Swirling-Oxidizer-Flow-Type Hybrid Rocket
Tomoaki Usuki
JAXA, Japan

Numerical Analysis of Hybrid Rocket Combustion Chamber Instabilities Using Computational Fluid Dynamics
Goutham Karthikeyan
JAXA, Japan

Planning of Fuel Regression-Rate Measurement of Altering-Intensity Swirling-Oxidizer-Flow-Type Hybrid Rocket
Kohei Ozawa1,2, Koki Kitagawa1, Toru Shimada1, Genki Mishima1, Tomoaki Usuki1
1Institute of Space and Astronautical Science, JAXA, Japan, 2Research Fellow of the Japan Society for the Promotion of Science

[ SESSION ] Hybrid Rocket (2)

Session Date        July 7 (Tue) 17:00 – 18:40
Room                Kobe International Conference Center, Meeting Room 403
Chairpersons        Jong-Shinn Wu (National Chiao Tung University, Taiwan)
                    Harunori Nagata (Hokkaido University, Japan)

Study on a Plasma Jet Igniter for a Hybrid Rocket
Ryota Kimura
Tokai University, Japan
Fundamental Study on Clustered Hybrid Rockets for Rocket Sled Propulsion System
Daisuke Nakata, Shuhei Horio, Kazuyuki Higashino, Nobuhiro Tanatsugu
Muroran Institute of Technology, Japan

Study of Module Type Hybrid Rocket Engine with Multi-Section Swirl Injection Method
Masato Mizuchi1, Kengo Oka1, Hiroshi Tada1, Masato Yamashita1, Shigeru Aso1, Yasuhiro Tani1, Toru Shimada2
1Kyushu University, Japan, 2Institute of Space and Astronautical Science, Japan

Effect of Post Combustion Chamber on Hybrid Rocket Motor Performance
Shaiilesh Singh, Palani Kumar, Amit Kumar
IIT Madras, India

Rheology of Ethanol Based Hybrid Solid Propellant: Effect of Methyl Cellulose Concentration
Jerin John, Botchu. V. S. Jyoti, Seung Wook Baek
School of Mechanical, Aerospace and Systems Engineering Korea Advanced Institute of Science and Technology (KAIST), Korea

Optimization of Ballistic Performance for Launch Vehicle using Hybrid Rocket Engine Based on Enhanced Flight Simulation
Masahiro Kanazaki1, Athaphon Artyart1, Hideyuki Yoda1, Shoma Ito1, Kazuhisa Chiba2, Koki Kitagawa3, Toru Shimada3
1Tokyo Metropolitan University, Japan, 2The University of Electro Communications, Japan, 3JAXA, Japan

Development of Restartable Hybrid Rocket Motor with Hydrogen Peroxide as Oxidizer
Yu-Lun Li, Cheng-Ru Lu, Hung-Wei Hsu, Yei-Chin Chao
National Cheng Kung University, Taiwan

Development of High-Performance Dual-Vortical Hybrid Rocket Motor
K.R. Lai1, T.H Chou1, S.S. Wei1, J.W. Lin1, J.S. Wu1, Y.S. Chen2
1National Chiao Tung University, Taiwan, 2National Space Organization, Taiwan

Estimation of Hybrid Rocket Nozzle Throat Erosion History
Yuji Saito1, Tsutomu Uematsu2, Hikaru Ischii2, Masashi Wakiya1, Tsuyoshi Totani1, Harunori Nagata1
1Hokkaido University, Japan, 2Uematsu Electronic Corporation, Ltd., Japan

Numerical Simulation of Incompletely Premixed Oblique Detonation Stabilized on a Solid Surface
Kazuya Iswata, Shinji Nakaya, Mitsuhiro Tsue
The University of Tokyo, Japan
[a-7] Detonation Engine (2)

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<td>Shigeru Aso (Kyushu University, Japan)</td>
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<td>Masashi Wakita (Hokkaido University, Japan)</td>
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2015-a-30 (15:00 - 15:20)
Experimentally Performance Evaluation of a Rotating Detonation Engine with a Conical-Shape Nozzle
Kazuki Ishihara1, Yuichi Kato1, Ken Matsuoka1, Jiro Kasahara1, Akiko Matsu2, Ikko Funaki3
1Nagoya University, Japan, 2Koto University, Japan, 3ISAS/JAXA, Japan

2015-a-31 (15:20 - 15:40)
A Study on Detonation Properties of Ethylene/Methane/Ethane Blended Fuels
Shinji Okada1, Satoshi Shibata1, Hidetumi Kataoka1, Daisuke Segawa1, Kazuhiro Ishii2, Koji Fumoto2, Atsuhiro Kawamura2
1Osaka Prefectural University, Japan, 2Yokohama National University, Japan, 3Hokkaido University, Japan, 4Kushiro National College of Technology, Japan

2015-a-32 (15:40 - 16:00)
A Study on Operating Conditions of Rotating Detonation Engine with Internal Mixing
Kazuhiro Ishii, Aroto Nojima
Yokohama National University, Japan

2015-a-33 (16:00 - 16:20)
Evaluation of Thrust Performance on Rotating Detonation Engine for a JP10-Air Mixture
Wataru Yoshida1, Makoto Asahara1, Nobuyuki Tsuboi2, A. Koichi Hayashi1
1Aoyama Gakuin University, Japan, 2Kyushu Institute of Technology, Japan

2015-a-34 (16:20 - 16:40)
Numerical Investigation of Wall Temperature Effect on the Structural Response of Thin-Walled Tube under Kerosene-Air Mixture Detonation
Jaick Yoh
Seoul National University, Korea

[a-8] Cryogenic Fuel

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<td>Chairpersons</td>
<td>Justin Steven Hardi (German Aerospace Center (DLR), Germany)</td>
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<td>Takehiro Himeno (The University of Tokyo, Japan)</td>
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2015-a-35 (17:00 - 17:20)
Numerical Simulation of Unsteady Cavitation by Direct Interface Capturing Approach
Naoya Takeda1, Takehiro Himeno1, Yutaka Umemura2, Toshinori Watanabe3
1University of Tokyo, Japan, 2JAXA, Japan
Evaluation of Temperature Stratification in Cooling Channels through LE-X Hot-Fire Testing Series
Masaki Adachi1, Daiki Watanabe1, Tadaoki Onga1, Hiroyasu Manako1, Nobuki Negoro2, Akihide Kurosu1, Teiu Kobayashi2, Koichi Okita2
1Mitsubishi Heavy Industries, Japan, 2JAXA, Japan

Heat Transfer Characteristics of the Cryogenic Liquid Fuel on a Surface with a Thin Insulating Layer
Daisuke Takeda
Shizuoka University, Japan

Effect of Cross-Sectional Shape and Distance in a Countermeasure of Frost Formation Using an Obstacle
Sota Sato
Shizuoka University, Japan

Characteristics of Jet-Mixing at Supercritical Pressure for Coaxial Rocket Injector Design
Daiki Muto1, Nobuyuki Tsuboi1, Hiroshi Terashima2
1Kyushu Institute of Technology, Japan, 2The University of Tokyo, Japan

Development of an Improved Swirl Coaxial Injector Design for Liquid Rockets
Tsung-Lin Yeh, Hung-Wei Hsu, Yei-Chin Chao
National Cheng Kung University, Taiwan

Conceptual Design Model of High Altitude Test Stand of Rocket Engine
Takeshi Kanda, Yohhei Ogawa, Daizo Sugimori, Makoto Kojima
Japan Aerospace Exploration Agency, Japan

Investigation on Recess Variation of a Shear Coax Injector for a Single Element GOX-GCH4 Combustion Chamber
Simona Silvestri1, Maria Paola Celano1, Christoph Kirchberger2, Gregor Schlieben1, Oskar Haidn1, Oliver Knab3
1Institute of Flight Propulsion (TUM), Germany, 2German Aerospace Center (DLR), Germany, 3Airbus Defence & Space, Ottobrunn, Germany

Gaseous Film Cooling Investigation and Model Assessment in a Subscale Single Element GCH4-GOX Combustion Chamber
Maria P. Celano1, Simona Silvestri1, Christoph Kirchberger2, Gregor Schlieben1, Dmitry I. Suslov1, Oskar J. Haidn1
1Institute of Flight Propulsion (TUM), Germany, 2German Aerospace Center (DLR), Germany
Radiative Heating in Combustion Chamber of Liquid Propellant Rocket Engines

Takeshi Kanda, Masaki Sato
Japan Aerospace Exploration Agency, Japan

Dynamic Characteristics of Open-Type Swirl Injector with Geometry Variations

Yunjae Chung, Youngbin Yoon
Seoual National University, Korea

Session Date: July 9 (Thurs) 14:00 – 15:40
Room: Kobe International Conference Center, Meeting Room 403
Chairpersons: Samuel Webster (German Aerospace Agency (DLR), Germany), Mitsuaki Tanabe (Nihon University, Japan)

Fabrication of the First Prototype Upper Main Combustion Chamber for a New Booster Engine of Japan’s Next Flagship Launch System

William Sack¹, Hiroyuki Kobayashi², Akira Ogawara², Hideo Sunakawa², Nobuki Negoro³
¹Aerojet Rocketdyne (AR), USA, ²Mitsubishi Heavy Industries (MHI), Japan, ³Japan Aerospace Exploration Agency (JAXA), Japan

Development of LE-9 Engine for Next Generation Launch Vehicle

Chinatsu Sezaki¹, Tadaoki Onga¹, Hiroyasu Manako¹, Takashi Tamura¹, Tsutomu Mizuno², Teiu Kobayashi³, Koichi Okita³
¹Mitsubishi Heavy Industries, Japan, ²IHI corporation, Japan, ³JAXA, Japan

Overview of Elemental Research Activities on the LE-X Engine

Takuo Onodera, Yoshio Nunome, Karu Kobayashi, Shinichi Moriya, Takeo Tomita, Akhide Kurosu
Japanese Aerospace Exploration Agency, Japan

KOBRA: Component Modelling for Rocket Engine Cycle Analysis

Armin Herbertz
German Aerospace Center (DLR), Institute of Space Propulsion, Germany

Session Date: July 9 (Thurs) 16:00 – 17:40
Room: Kobe International Conference Center, Meeting Room 403
Chairpersons: Chinatsu Sezaki (Mitsubishi Heavy Industries, Japan), William F. Sack (Aerojet Rocketdyne, USA)

Response of a Reacting Cryogenic Jet to Transverse Acoustic Instability

Justin Hardi¹, Hideto Kawashima², Samuel Webster¹, Michael Oschwald¹
¹German Aerospace Center (DLR), Germany, ²JAXA, Japan

Response of Triple Flame to Acoustic Oscillations

Nobuaki Sugi, Kazunori Motohashi, Masanori Saito, Mitsuaki Tanabe
Nihon University, Japan
Acoustic Dissipation in a Sub-Scale Combustion Chamber
Samuel Webster1, Justin Hardi1, Michael Oschwald1,2
1DLR’s Institute of Rocket Propulsion, Germany, 2RWTH Aachen University, Germany

Self-Excited Non-Linear Acoustic Wave in a Single-Element Model Rocket Combustor and Its Influence on Flame
Mitsuaki Tanabe1, Masanori Saito1, W. Zach Hallum2, Eric J. Meier2, Tristan L. Fuller2, William E. Anderson2
1Nihon University, Japan, 2Purdue University, USA

Combustor Resonance Frequency under Unstable Combustion
Hideto Kawashima1, Justin Hardi2, Samuel Webster2, Michael Oschwald2
1JAXA, Japan, 2DLR, Germany

Calculation of Heat Flux in the Pseudo-Shock Region
Kanenori Kato, Takeshi Kanda
JAXA, Japan

Combustion Performance of Hydrocarbon Fuel in a Dual-Mode Combustor
Kiyoshi Nojima1, Shin Ishizaki1, Mitsuhiro Soejima1, Sadatake Tomioka2, Noboru Sakuranaka2
1Tohoku University, Japan, 2JAXA, Japan

An Experimental Investigation of Streamwise Vortex Enhanced Combustion in Mach 2.5 Supersonic Flow
Noritsugu Kubo1, Sadatake Tomioka2, Shin Ishizaki1, Noboru Sakuranaka2
1Tohoku University, Japan, 2JAXA, Japan

The Effect of Swept Angle of Ramp Injector on Supersonic Mixing using Streamwise Vortices
Takakage Arai, Shuntaro Maruyama, Yamato Tsukazaki, Shoji Sakaue
Osaka Prefecture University, Japan

Temperature Measurement by Two-Band Emission Method with CO2 and H2O Molecules
Yuki Mor1, Shunya Shimada1, Shuhei Takahashi1, Tadayoshi Ihara1, Shinji Nakaya2, Mitsuhiro Tsue2
1Gifu University, Japan, 2The University of Tokyo, Japan

Investigation of Stabilization Effects in Hartmann-Sprenger Tubes
Johannes Schmidt, Martin Hauser, Christian Bauer, Oskar J. Haidn
Technische Universität München, Germany
### 2015-a-65 (11:20 - 11:40)

**Improvement of Combustion Stability of N2O/DME Bipropellant in Vacuum**

Tasuku Uraoka, Yoshikazu Iwao, Yasuyuki Yano, Akira Kakami  
University of Miyazaki, Japan

### 2015-a-66 (11:40 - 12:00)

**Combustion Characteristics of ADN-based Ionic Liquid Propellant**

Yuichiro Ide¹, Takuya Takahashi², Keiichiro Iwai², Katsuhiro Nozoe², Hiroto Habu³, Shinichiro Tokudome³  
¹The Graduate University for Advanced Studies, Japan, ²Caril Holdings Co., Ltd., Japan, ³JAXA, Japan

### 2015-a-67 (12:00 - 12:20)

**Response of the Arc Plasma Source to Combustion Chamber Pressure Fluctuation of the Small Size Thruster Using Plasma Support Combustion**

Hitoshi Asakawa, Yasuyuki Yano, Hiroaki Murata, Akira Kakami  
University of Miyazaki, Japan

### 2015-a-68 (12:20 - 12:40)

**Preliminary Design of Catalytic Beds for the H2O2 Decomposition for Space Propulsion Applications**

Chiara Boffa, Oskar J. Hasdin  
Institute for Flight Propulsion (LFA), Technische Universität München (TUM), Germany

### [a-15] Thruster and Propellants (2)

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<td>Christian Bauer (Technische Universität München, Germany), Osamu Imamura (Nihon University, Japan)</td>
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### 2015-a-69 (14:00 - 14:20)

**Development of High Performance HAN/HN Based Low Toxic Monopropellant**

Shinji Igarashi¹, Apollo B. Fukuchi¹, Keigo Hatai², Nobuyuki Azuma², Hideshi Kagawa², Hirohide Ikeda²  
¹IHI Aerospace Co., Ltd., Japan, ²JAXA, Japan

### 2015-a-70 (14:20 - 14:40)

**Fundamental Study on In-Liquid Plasma of HAN Based Propellant**

Takahiro Shindo, Asato Wada, Shunsuke Kawabata, Hiroshi Maeda, Toshiaki Iizuka, Hiroki Watanabe, Hanuki Takegahara  
Tokyo Metropolitan University, Japan

### 2015-a-71 (14:40 - 15:00)

**Performance Comparison between Single and Multi-Electrode System for Electrolytic Decomposition of HAN**

Wai Siong Chai  
University of Nottingham Malaysia Campus, Malaysia

### 2015-a-72 (15:00 - 15:20)

**Overview of Propellants Development in Malaysia**

Tengku Farah Wahida Ku Chik¹, Jitkai Chin², Adhwa Bin Amir Tan¹  
¹National Space Agency Malaysia (ANGKASA), Malaysia, ²University of Nottingham Malaysia Campus, Malaysia

### 2015-a-73 (15:20 - 15:40)

**Decomposition Characteristics of Energetic Ionic Liquid Propellants Based on Dinitramide Salts**

Hiroki Matsunaga¹, Hiroto Habu², Atsumi Miyake³  
¹Yokohama National University, Japan, ²JAXA, Japan

### [a-16] Thruster and Propellants (3)

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<td>Chairpersons</td>
<td>Chiara Boffa (Technische Universität München (TUM), Germany), Shinji Igarashi (IHI Aerospace Co., Ltd., Japan)</td>
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Spectroscopic Evaluation on Induction of Chemical Reaction in Green Propellant RCS with Discharge Plasma Catalyzer
Shuka Takeda, Toshiaki Iizuka, Asato Wada, Takahiro Shindo, Hiroki Watanabe, Haruki Takegahara
Tokyo Metropolitan University, Japan

Lox Evaporation with N2O Catalysis
Genki Mishima
JAXA, Japan

Effects of Geometric Swirl Number of Discharge Plasma Catalyzer on Green Monopropellant Reaction Characteristics
Asato Wada, Toshiaki Iizuka, Takahiro Shindo, Shunsuke Kawabata, Hiroshi Maeda, Hiroki Watanabe, Haruki Takegahara
Tokyo Metropolitan University, Japan

Eutectic Mechanism of Energetic Ionic Liquid Propellants Based on Ammonium Dinitramide
Masataka Itakura¹, Hiroki Matsunaga¹, Hiroto Habu², Atsumi Miyake¹
¹Yokohama National University, Japan, ²Japan Aerospace Exploration Agency (JAXA), Japan

IEPC Opening
Session Date: July 7 (Tue) 8:30 – 8:45
Room: Kobe International Conference Center, ASTROSCALE Main Hall
Chairpersons: Stefanos Fasoulas (University of Stuttgart, Germany)
Yoshihiro Arakawa (Teikyo Heisei University, Japan)

[b-1-1] World EP activities
Session Date: July 7 (Tue) 9:00 – 10:40
Room: Kobe International Conference Center, ASTROSCALE Main Hall
Chairpersons: Stefanos Fasoulas (University of Stuttgart, Germany)
Yoshihiro Arakawa (Teikyo Heisei University, Japan)

Overview of Electric Propulsion Research Activities in Japan
Haruki Takegahara¹, Shunjiro Shinohara², Takao Tanikawa², Akira Ando³, Hirokazu Tahara³, Akhiro Sasof³, Kimiya Komurasaki³, Hitoshi Kuninaka³, Ikkoh Funaki³, Takeshi Miyasaka⁴, Naoji Yamamoto⁵
¹Tokyo Metropolitan University, Japan, ²Tokyo University of Agriculture and Technology, Japan, ³Tokai University, Japan, ⁴Tohoku University, Japan, ⁵Osaka Institute of Technology, Japan, ⁶Kyushu University, Japan, ⁷The University of Tokyo, Japan, ⁸JAXA, ISAS, Japan, ⁹Gifu University, Japan, ¹⁰Kyushu University, Japan

European Space Agency (ESA) Electric Propulsion Activities
J. Gonzalez del Amo
European Space Agency, ESTEC, The Netherlands

Experience of Moscow Aviation Institute in the Field of Electric Propulsion: History and State of the Art
Sergey Khartov, Andrey Nadiradze, Igor Nazarenko, Stanislav Servuk, Maria Smimova
Moscow Aviation Institute National Research University, Russia

Space Systems Loral Electric Propulsion Subsystem: 10 Years of on Orbit Operation
Jorge J. Delgado, Jeff A. Baldwin
Space Systems Loral, USA

An Overview of Electric Propulsion Activities at CNES
Claude Boniface, Nicolas Arcis
Centre National d'Outils Spatiales (CNES), France
**[b-1-2] Demonstration Missions with EP**

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</table>
| Chairpersons       | Richard R. Hofer (Jet Propulsion Laboratory, USA)  
Naoji Nagao (JAXA, Japan) |

**DEOMICRITOS Demonstrators for Realization of Nuclear Electric Propulsion of the European Roadmaps MEGAHit & DiPoP**

Frank Jansen1, Waldemar Bauer1, Frédéric Masson2, Jean-Marc Rual1, Jean-Claude Worms3, Emmanouil Detis3, Francois Lassoudiere4, Richard Granjon4, Enrico Gaia5, Maria Cristina Tosi5, Anatoly S. Koroteev6, Alexander V. Semenkin6, Tim Tinsley7, Zara Hodgson7, Christoph Kopp6, Lamartine Nogueira Frutuoso Guimarães9

1DLR Bremen, Germany, 2CNES Paris, France, 3ESTRASBOURG, France, 4Aristus Sahran Launchers, France, 5Thales Alenia Space Torino, Italy, 6Kiotly Research Center Moscow, Russia, 7National Nuclear Laboratory, UK, 8KopooS Consulting Ind. Paris (for DiPoP Consortium), France, 9Instituto de Estudos Avançados, Brazil

**[b-1-3] Hall Thruster Diagnostics**

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| Chairpersons       | Rostislav Spektor (The Aerospace Corporation, USA)  
Naoji Yamamoto (Kyushu University, Japan) |


**Performance Characterization of the Solar Electric Propulsion Technology Demonstration Mission 12.5-kW Hall Thruster**

Hani Kamhawi1, Thomas Haag1, Wensheng Huang1, Daniel Herman1, Robert Thomas1, Rohit Shasrty1, John Yim1, Li Chang1, Lauren Clayman1, Timothy Verhey1, Christopher Griffith2, James Myers2, George Williams3, Ioannis Mekidides4, Richard Hofer4, James Polk4, Ben Jorns4

1NASA Glenn Research Center, USA, 2Vantage Partners LLC, USA, 3Ohio Aerospace Institute, USA, 4Jet Propulsion Laboratory, California Institute of Technology, USA

**IEPC-2015-10/ISTS-2015-b-10 ( 9:00 - 9:20 )**

**Performance and Plume Characterization of the SPT100-D Thruster**

F. Scortecci1, S. Scaranzin1, D. Pagano1, G. Meniconi1, N. Kutufa2

1Aerospazio Tecnologie s.r.i., Italy, 2ESA/ESTEC, The Netherlands


**Assessment of Azimuthal Homogeneity of Neutral Gas in a Hall Effect Thruster using Electron Beam Fluorescence**

Julien Jamge1, Denis Packan1, Olivier Duchemin2, Lahib Balika2

1ONERA-The French Aerospace Lab, France, 2SECOM, France

**IEPC-2015-13/ISTS-2015-b-13 ( 9:40 - 10:00 )**

**Local Plasma Parameter Measurement in Hall Thruster**

Andriy Loyan, Nikolay Koshelev, Maksym Titov

Zhukovsky National Aerospace University “KhAI”, Ukraine

**[b-1-4] Cathode Modelling & Simulation**

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IEPC-2015-14/ISTS-2015-b-14 (9:00 - 9:20)
Hollow Cathode Modelling: a First Approach on Scaling Laws
Gaëtan Sary1,2, Laurent Garrigues1, Jean-Pierre Boeuf1,2
1Laplace, Université de Toulouse, UPS, INPT Toulouse, France, 2CNRS, Laplace, France

Hybrid-PIC Simulation on Plasma Flow of Hollow Cathode
Kenichi Kubota1, Yuya Oshio1, Hiroki Watanabe2, Shinatora Cho1, Yasushi Ohkawa1, Ikkoh Funaki1
1JAXA, Japan, 2Tokyo Metropolitan University, Japan

IEPC-2015-16/ISTS-2015-b-16 (9:40 - 10:00)
Numerical Simulation of Keeper Erosion in a 6-kW Laboratory Hall Thruster
Maria Choi, Iain D. Boyd
University of Michigan Ann Arbor, U.S.A.

IEPC-2015-17/ISTS-2015-b-17 (10:00 - 10:20)
Study on Hollow Cathode Model and Inner Pressure
Bingjan An, Zhongxi Ning, Daren Yu
Harbin Institute of Technology, China

[b-1-5] Pulse Plasma Thruster Research Overview

IEPC-2015-18/ISTS-2015-b-18 (9:00 - 9:20)
SSC ZOND with APPT Based EPS
Nickolay N. Antropov1, Michael N. Kazarov2, Vladimir P. Khodinenko3
1Research Institute of Applied Mechanics and Electrodynamics, Russia, 2National Research Centre, Russia, 3All-Russian Research Institute of Electromechanics, Russia

Review of Thermal Pulsed Plasma Thruster: Concept, Categorization, and Application
Yung-An Chan1, Georg Herdinch1, Tony Schönherr2
1University of Stuttgart, Germany, 2The University of Tokyo, Japan

IEPC-2015-21/ISTS-2015-b-21 (9:40 - 10:00)
Pulsed Plasma Thruster - Subsystem Engineering at IRS
Matthias Lau, Georg Herdinch
University of Stuttgart, Germany

IEPC-2015-22/ISTS-2015-b-22 (10:00 - 10:20)
Research and Development of High-Power Electrothermal Pulsed Plasma Thruster Systems for Osaka Institute of Technology 2nd PROITERES Nano-Satellite
Keita Kanaoka1, Ryota Fujita1, Rikio Murakawa1, Hirokazu Tahara1, Takashi Wakiyono2
1Osaka Institute of Technology, Japan, 2High Serve, Japan

[b-1-6] Nuclear Powered Propulsion

### [b-2-1] Overview of R&D activities

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<td>Giorgio Saccoccia (European Space Agency, Netherlands)</td>
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### [b-2-2] Near-Earth Missions with EP

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<td>Hani Kamhawi (NASA Glenn Research Center, USA)</td>
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<td>Yasushi Ohkawa (JAXA, Japan)</td>
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**Research on Specific Mass of High Power Nuclear Electric Propulsion System with High Temperature Gas-Cooled Reactor**

Cheng Zhou, Ge Wang, Yanming Wei, Junqiang Liang, Jun Gao, Zhangyang Tang  
Beijing Institute of Control Engineering, China

### IEPC-2015-25/ISTS-2015-b-25 (9:40 - 10:00)

**Schematic Design of Mars Exploration Mission with Nuclear Electric Propulsion System**

Wang Ge, Zhou Cheng, Liang Junqiang, Gao Jun  
Beijing Institute of Control Engineering, China

### IEPC-2015-26/ISTS-2015-b-26 (10:00 - 10:20)

**Preliminary Results on a Low-Energy RMF FRC Translation Experiment for Space Propulsion**

Carrie Hill1, Nolan Uchizono1, Michael Holmes2  
1ERC Inc, USA, 2US Air Force Research Laboratory, USA

### IEPC-2015-28/ISTS-2015-b-28 (11:00 - 11:20)

**R&D Activities of Electric Propulsion in Japan**

Yasuhiro Saito, Kiyoshi Kinefuchi, Naoki Nagao, Koichi Okita, Hitoshi Kuninaka  
JAXA, Japan


**Electric Propulsion Activities at ONERA**

Denis Packan1, Paul-Quentin Elias1, Julien Jarra1, Felix Cannat1,2, Clément Zaeffel1, Julien Labaune1, Trevor Laffleur1,2  
1ONERA – The French Aerospace Lab., France, 2Laboratoire de Physique des Plasmas – CNRS, France

### IEPC-2015-30/ISTS-2015-b-30 (11:40 - 12:00)

**Electric Propulsion Developments at Rafael**

Jacob Herscovitz, Zvi (Zucki) Zuckerman  
Space Systems Directorate, ISRAEL

### IEPC-2015-31/ISTS-2015-b-31 (12:00 - 12:20)

**The Electric Propulsion Progress in LIP-2015**

Tianping Zhang, Le Yang, Hao Yang, Xianming Wu, Jianfei Long, Mingming Sun  
Lanzhou Institute of Physics, China

### IEPC-2015-33/ISTS-2015-b-33 (11:00 - 11:20)

**Water Electrical Propulsion System Combined with Manned Space Mission**

Yuichiro Nogawa1, Hirokazu Tahara2  
12011 LLC, Japan, 2Osaka Institute of Technology, Japan
### [b-2-5] Pulse Plasma Thruster Performance

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</table>
| Chairpersons       | Michael Keidar (The George Washington University, USA)  
                     Hirokazu Tahara (Osaka Institute of Technology, Japan) |

  - **Performance Analysis of a Double Discharge Pulsed Plasma Thruster by Varying the Energy Distribution Amongst Its Two Stages**
    - Luis Francisco Chrispim Marin, Rodrigo Intri Marques  
      INPE - The Brazilian National Institute for Space Research, Brazil

  - **Non-Phase-Difference Rogowski Coil for Measuring Pulsed Plasma Thruster Discharge Current**
    - Zhang Zhe, Tang Habin, Zhangzun  
      Beihang university, China

- **IEPC-2015-50/ISTS-2015-b-50 (11:40 - 12:00)**
  - **Design and Testing of a Small Inductive Pulsed Plasma Thruster**
    - Adam K. Martin, Richard H. Eskridge, Alexandra Dominguez, Kurt A. Polzin, Daniel P. Riley, Adam C. Kimberlin  
      NASA-Marshall Space Flight Center, USA

- **IEPC-2015-51/ISTS-2015-b-51 (12:00 - 12:20)**
  - **Development of an Engineering Optimization tool for Miniature Pulsed Plasma Thrusters**
    - Igor O. Golosnoy1, Stephen B. Gabriel1, Simone Ciaralli2, Michele Coletti2  
      1University of Southampton, UK, 2Mars Space Ltd., UK

  - **Development of a Numerical Model for the Optimization of Pulse Plasma Thrusters Performance**
    - Simone Ciaralli1, Michele Coletti1, Igor Golosnoy2, Stephen B. Gabriel2  
      1Mars Space Ltd., UK, 2University of Southampton, UK
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<tr>
<th>Title</th>
<th>Authors</th>
<th>Institution</th>
<th>Date/Time</th>
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<td>Analysis of Ignition of the Micro Cathode Arc Thruster</td>
<td>George Teel, Joseph Lukas, Alexei Shashurin, Michael Keidar</td>
<td>The George Washington University, USA</td>
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<td>Experimental Investigation of an Aluminium Fuelled Vacuum Arc Thruster</td>
<td>Jonathan Kolbeck, Aaron Knoll</td>
<td>Technical University of Berlin, Germany, Surrey Space Centre, UK</td>
<td>11:20 – 11:40</td>
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<td>Analysis of Vacuum Arc using Solar Array Materials</td>
<td>Joel Slotten, George Teel, Dereck Chiu, Michael Keidar</td>
<td>The George Washington University, USA</td>
<td>11:40 – 12:00</td>
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<td>Numerical Studies of Micro-Cathode Arc Thruster Plume Expansion</td>
<td>Lubos Brieda, Michael Keidar</td>
<td>Particle In Cell Consulting LLC, USA, The George Washington University, USA</td>
<td>12:00 – 12:20</td>
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### [b-3-1] EP Research Laboratories' Report

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<td>Chairpersons</td>
<td>Roger Myers (Aerojet Rocketdyne, USA)</td>
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### [b-3-2] Interplanetary Flight by EP

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IEPC-2015-64/ISTS-2015-b-64 (15:00 - 15:20)

Advanced Solar Electric Propulsion for Planetary Defense and Asteroid Resource Utilization
John R. Brophy
Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA


Electric Propulsion for Deep Space: a Study Case «JUpiter ICy Moon » with Electric Propulsion
Frederic Marchandise1, Christophe R. Koppel2
1Safran, France, 2KopooS Consulting, France


Modeling of Force Impact on Large-Sized Object of Space Debris Ion Injection
Andrey Nadiradze1, Vladimir Obukhov2, Gari Popov2, Victoria Svotina2
1Moscow Aviation Institute, Russia, 2Research Institute of Applied Mechanics and Electrodynamics of MAI, Russia

IEPC-2015-67/ISTS-2015-b-67 (16:00 - 16:20)

Electrodeless Lorentz Force (ELF) Thruster for ISRU and Sample Return Mission
Anthony Pancotti, David Kirtley, John Slough, Justin Little
MSNW LLC, USA


Mars Mission Trade Studies and Technology Development of a 36 MW Fusion Rocket
Anthony Pancotti1, John Slough1, George Votroubek1, Akihisa Shimazu2
1MSNW LLC, USA, 2University of Washington, USA

[b-3-3] Hall Thruster Plume Interaction

Session Date
July 7 (Tue) 15:00 – 16:40

Room
Portopia Hotel, Main Building "Nunobiki"

Chairpersons
Tommaso Misuri (Alta S.p.A., Italy)
Takanobu Muranaka (Chukyo University, Japan)


Performance and Plume Characterization of the BHT-1500 Hall Thruster
Kevin D. Diamant1, Thomas J. Curtiss1, Rostislav Sekput1, Edward J. Beiting1, Vlad Hruby2, Bruce Pote3, Juraj Kolencik2, Surjeet Paintal2
1The Aerospace Corporation, USA, 2The Busek Company, USA


Characteristics of Side by Side Operation of Hall Thruster
Takehsi Miyasaka, Katsu Asato, Daiki Furuta, Yudai Uyama, Ryota Goto, Daichi Shimizu, Mikoto Yoshida, Masahiro Sakoda, Yoshimi Miyake
Gifu University, Japan

IEPC-2015-71/ISTS-2015-b-71 (15:40 - 16:00)

Plume Modelling of a Two CAMILA Hall Thrusters Cluster for Thrust Vectoring
Matteo Laterza, Moshe Guelman
Technion – Israel Institute of Technology, Israel

IEPC-2015-72/ISTS-2015-b-72 (16:00 - 16:20)

A Model-Based Analysis of Stationary Plasma Thruster Interference in Radio-Frequency Range
Nikolay Vazhenin, Andrey Plokhikh, Galina Soganova
Research Institute of Applied Mechanics and Electrodynamics of MAI, Russia


The Importance of the Cathode Plume and Its Interactions with the Ion Beam in Numerical Simulations of Hall Thrusters
Alejandro Lopez Ortega, Ioannis G. Mikelides
Jet Propulsion Laboratory, California Institute of Technology, USA
[b-3-4] Cathode Plume (1)

Session Date: July 7 (Tue) 15:00 – 16:20
Room: Portopia Hotel, Main Building "Kitano"
Chairpersons: James Pok (Jet Propulsion Laboratory, California Institute of Technology, USA), Akira Iwakawa (Nagoya University, Japan)

Plume Structure Study of Hollow Cathode in Bias Voltage Conditions
Qimeng Xia, Kan Xie, Xiangyang Liu, Zhiwen Wu, Ningfei Wang
School of Aerospace Engineering, Beijing Institute of Technology, China

The High Frequency of Ion Acoustic Waves (Potential Oscillations) near the Cathode in Ion Thrusters
Yu. Qin, Kan. Xie, JiTing. Ouyang
Beijing Institute of Technology, China

IEPC-2015-75/ISTS-2015-b-75 (15:40 - 16:00)
Atomic Oxygen Effect to Performance of the Hollow Cathode of 20mN Ion Thruster
Yasutaka Inanaga1, Toshiyuki Ozaki1, Gaku Oinuma1, Kazuo Shuto1, Yukio Hayakawa2, Hiroshi Nagano2
1MELCO, Japan, 2JAXA, Japan

IEPC-2015-77/ISTS-2015-b-77 (16:00 - 16:20)
Influence of Magnetic Field on Hollow Cathode Discharge Characteristics
Tianhang Meng, Zhongqi Ning, Daren Yu
Harbin Institute of Technology, China

[b-3-5] Pulse Plasma Thruster Physics (1)

Session Date: July 7 (Tue) 15:00 – 16:40
Room: Portopia Hotel, Main Building "Kikusui"
Chairpersons: Michael Kazeev (NRC Kurchatov Institute, Russia), Hideto Mashidori (Tokyo Metropolitan College of Industrial Technology, Japan)

IEPC-2015-78/ISTS-2015-b-78 (15:00 - 15:20)
Ablation and Ionization Phenomenon in a Teflon Pulsed Plasma Thruster
Lei Yang1, Yuping Huang1, Haibin Tang2, Xiangyang Liu3
1Beijing Research Institute of Precision Mechatronics Controls, China, 2Beihang University, China, 3Beijing Institute of Technology, China

Investigation of Discharge Arc Phenomena in Ablative PPT
Tony Schönherr1, Marcus Stein1,2, Kimiya Komurasaki1, Georg Herdrich2
1The University of Tokyo, Japan, 2University of Stuttgart, Germany

IEPC-2015-80/ISTS-2015-b-80 (15:40 - 16:00)
Short Pulse Characteristics of a Laser-Assisted Pulsed Plasma Thruster
Kouta Matsubara, Hiroshi Hosokawa, Nao Akashi, Haruna Hasegawa, Hideyuki Horisawa
Tokai University, Japan

IEPC-2015-81/ISTS-2015-b-81 (16:00 - 16:20)
High Pulse Repetition Frequency Operation of a Low-Power Short-Pulse Plasma Thruster
Yuki Nakamura, Hideyuki Horisawa
Tokai University, Japan

Study of a Coaxial Vacuum Arc Thruster Plume and Its Interaction with Applied Magnetic Field
Manuel Jimenez Diaz1,2, Freddy Gaboriau1,2, Laurent Liard1,2, Antoine Blanchet1, Luc Herrero3, Gerjan J M Hagelaar1,2, Laurent Garrigues1,2
1Université de Toulouse, France, 2CNRS, France, 3COMAT, France
IEPC-2015/ISTS-2015-b-83 (15:00 - 15:20)

Research on Jet Extraction Modes of Inertial Electrostatic Confinement Devices for Electric Propulsion Applications
Constanze Syring, Georg Herdrich
University of Stuttgart, Germany


Modeling Low Current E x B Discharge Seeded by Metallic Plasma
Igal Kronhaus
Technion - Israel Institute of Technology, Israel

IEPC-2015/ISTS-2015-b-87 (15:40 - 16:00)

A High Power Electrodeless Plasma Thruster Operated with a FET-Based Inverter Power Supply
Takayoshi Ishiyama, Aki Chiba, Kazunori Takahashi, Atsushi Komuro, Akira Ando
Tohoku University, Japan

[b-4-1] Ion Thruster Research Overview (1)

IEPC-2015/ISTS-2015-b-88 (17:00 - 17:20)

In-Flight Operation of the Dawn Ion Propulsion System: Arrival at Ceres
Charles Garner, Marc Rayman
Jet Propulsion Laboratory, California Institute of Technology, USA


Overview of the Research Activities of the RITSAT-Project
Peter J. Klar1, Klaus Hannemann1,2, Ubbo Ricklefs3, Hans Leiter4
1Justus-Liebig University Giessen, Germany, 2DLR Goettingen, Germany, 3THM University of Applied Sciences, Germany, 4Airbus DS Lampoldshausen, Germany

IEPC-2015/ISTS-2015-b-90 (17:40 - 18:00)

Evolution of the AIRBUS DS GmbH Radio Frequency Ion Thruster Family
Hans J. Leiter, Christian Altmann, Ralf Kukies, Jürgen Kuhmann, Jan-Patrick Porst
AIRBUS DS GmbH, Germany

IEPC-2015/ISTS-2015-b-91 (18:00 - 18:20)

Overview of RIT Simulation Areas in Giessen with Focus on Plasma Simulation
Robert Henrich1, Michael Becker1, Waldemar Gärner1, Chris Volkmar2, Kristof Hoiste1, Christian Heiliger1
1Justus-Liebig-University of Giessen, Germany, 2Technische Hochschule Mittelhessen, Germany

[b-4-2] Orbital Transfer with EP

IEPC-2015/ISTS-2015-b-95 (17:00 - 17:20)

Session Date: July 7 (Tue) 17:00 – 18:20
Room: Portopia Hotel, Main Building "Ikuta"
Chairpersons: Jose Antonio Gonzalez del Amo (European Space Agency, the Netherlands), Yasuhiro Saitoh (Space Transportation System Research and Development Center, Japan)
**[b-4-5] Pulse Plasma Thruster Physics (2)**

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<td>Chairpersons</td>
<td>Michael Kazeev (NRC Kurchatov Institute, Russia)</td>
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<td>Akira Kakami (University of Miyazaki, Japan)</td>
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**IEPC-2015-109/ISTS-2015-b-109 ( 17:00 - 17:20 )**

**Plasma Behaviours and Magnetic Field Distributions of a Short-Pulse Laser-Assisted Pulsed Plasma Thruster**

Nao Akashi, Hiroto Moriya, Yuji Oigawa, Hiroshi Hosokawa, Hideyuki Horigawa
Tokai University, Japan


**Study on Propellant Carbonization Process of Pulsed Plasma Thruster**

Guanyu Zuo, Xiangyang Liu, Siyu Wang, Ningfei Wang, Zhiwen Wu, Kan Xie
Beijing Institute of Technology, China


**Study on the Ignition of Pulse Plasma Thrusters**

Tiankun Huang, Zhiwen Wu, Shiyou Yuan, Xiangyang Liu, Kan Xie, Ningfei Wang, Yue Cheng
Beijing Institute of Technology, China


**Study on Heat Transfer Mechanism of Teflon Surface in Pulsed Plasma Thruster**

Siyu Wang, Xiangyang Liu, Zhiwen Wu, Kan Xie, Yue Cheng, Ningfei Wang
Beijing Institute of Technology, China

**[b-4-6] Advanced Propulsion Concept (2)**

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<td>Chairpersons</td>
<td>Wonho Choe (KAIST, Korea)</td>
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<td>Yasuhisa Oda (Japan Atomic Energy Agency, Japan)</td>
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**IEPC-2015-114/ISTS-2015-b-114 ( 17:00 - 17:20 )**

**Experimental Study of Electron Beam Extraction from ECR Neutralize**

Juan Yang\(^1\), Yizhou Jin\(^1\), Liao Luo\(^1\), Yuquan Wang\(^1\), Hui Liu\(^2\)
\(^1\)Northeastern Polytechnic University, China, \(^2\)Harbin Institute of Technology, China

**Effects of Magnetic Field Amplitude on the Near-Cathode Ion Velocity Distribution**

Marcel Georgin, Christopher Durot, Alec D. Gallimore
University of Michigan, USA

**Experimental Study of the Effects of Different Design Parameters on the Plasma Characteristics and the Extracted Current of a Prototype Radio-Frequency ICP Cathode**

Sina Jahanbakhsh, Mert Satir, Murat Celik
Bogazici University, Turkey

**Study on Propellant Carbonization Process of Pulsed Plasma Thruster**

Guanyu Zuo, Xiangyang Liu, Siyu Wang, Ningfei Wang, Zhiwen Wu, Kan Xie
Beijing Institute of Technology, China

**Study on the Ignition of Pulse Plasma Thrusters**

Tiankun Huang, Zhiwen Wu, Shiyou Yuan, Xiangyang Liu, Kan Xie, Ningfei Wang, Yue Cheng
Beijing Institute of Technology, China

**Study on Heat Transfer Mechanism of Teflon Surface in Pulsed Plasma Thruster**

Siyu Wang, Xiangyang Liu, Zhiwen Wu, Kan Xie, Yue Cheng, Ningfei Wang
Beijing Institute of Technology, China
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<th>Authors</th>
<th>Institution</th>
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<tr>
<td>July 8 (Wed) 9:00</td>
<td>9:00 – 10:40</td>
<td>Thrusters for Microsatellites: FEEP &amp; Colloid Thrusters</td>
<td>Daniel Reppin, Florian Kuhl, Torsten Henning, Jürgen Janek, Peter J. Klar</td>
<td>Justus Liebig University Gießen, Germany</td>
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<tr>
<td>July 8 (Wed) 9:00</td>
<td>9:00 – 10:40</td>
<td>Ion Emitters for Potential Micro-Thruster Applications</td>
<td>Katharina Huhn, Torsten Henning, Stefan Hengsbach, Peter J. Klar</td>
<td>Justus Liebig University Gießen, Germany</td>
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<tr>
<td>July 8 (Wed) 9:00</td>
<td>9:00 – 10:40</td>
<td>Colloid Emitters in Photostructurable Polymer Technology: Fabrication and Characterisation Progress Report</td>
<td>Katharina Huhn, Torsten Henning, Stefan Hengsbach, Peter J. Klar</td>
<td>Justus Liebig University Gießen, Germany</td>
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<tr>
<td>July 8 (Wed) 9:00</td>
<td>9:00 – 10:40</td>
<td>NanoFEEP on UWE Platform - Formation Flying of CubeSats using Miniaturized Field Emission Electric Propulsion Thrusters</td>
<td>Daniel Bock, Alexander Kramer, Philip Bangert, Klaus Schilling, Martin Tajmar</td>
<td>Technische Universität Dresden, Germany</td>
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<tr>
<td>July 8 (Wed) 9:00</td>
<td>9:00 – 10:40</td>
<td>Investigation of Capillary Type Liquid Metal Ion Emitters</td>
<td>C. Scharlemann, Nembo Buldini, Florin Plesescu, Alexander Reissner</td>
<td>The University of Applied Sciences Wiener Neustadt, Austria, FOTEC Forschungs- und Technologietransfer GmbH, Austria</td>
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<td>July 8 (Wed) 9:00</td>
<td>9:00 – 10:40</td>
<td>Testing and Modelling of the mN-FEEP Start-Up Performance</td>
<td>Alexander Reissner, Nembo Buldini, Bernhard Seifert, Thomas Hörbs, Florin Plesescu, Carsten Scharlemann, Jose Gonzalez del Amo, Luca Massotti</td>
<td>FOTEC Forschungs- und Technologietransfer GmbH, Austria, ESA (ESTEC), The Netherlands</td>
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<td>July 8 (Wed) 9:00</td>
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<td><strong>Proof-Of-Concept Demonstration of the PEGASES Plasma Thruster</strong></td>
<td>Trevor Lafleur, Dmytro Rafalskyi, Pascaline Grondein, Pascal Chabert, Ane Aanesland</td>
<td>Laboratoire de Physique des Plasmas, Ecole Polytechnique, France, ONERA, The French Aerospace Lab, France</td>
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<td>July 8 (Wed) 9:00</td>
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<td>Antenna-Wave Coupling Efficiency in the Direct Wave-Drive Thruster</td>
<td>Matthew S. Feldman, Edgar Y. Choueini</td>
<td>Princeton University, USA</td>
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<td>July 8 (Wed) 9:00</td>
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<td>Alternative Neutralization Technique for a 40 Watt Confinement Thruster</td>
<td>Aaron Knoll, Thomas Harle</td>
<td>University of Surrey, UK</td>
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<td>July 8 (Wed) 9:00</td>
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<td>Collisionless Electron Cooling on Magnetized Plasma Expansions: Advances on Modelling</td>
<td>Jaume Navarro-Cavaller, Sara Correyero, Eduardo Aheko</td>
<td>Universidad Politécnica de Madrid, Spain, Universidad Carlos III de Madrid (EP2-UC3M), Spain</td>
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<td>July 8 (Wed) 9:00</td>
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<td>A Langmuir Probe Investigation of the Plasma Properties of the Jet from an Inertial Electrostatic Confinement Device IEPC-2015-xxx</td>
<td>C. Ryan, André Peyraud, A. Knoll</td>
<td>University of Surrey, UK</td>
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<td><strong>Ion Emitters for Potential Micro-Thruster Applications</strong></td>
<td>Katharina Huhn, Torsten Henning, Stefan Hengsbach, Peter J. Klar</td>
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<td>University of Surrey, UK</td>
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<td>IEPC-2015-125/ISTS-2015-b-125</td>
<td>30-kW Performance of a 100-kW Class Nested-Channel Hall Thruster</td>
<td>Scott J. Hall, Sarah E. Cusson, Alec D. Gallimore</td>
<td>The University of Michigan, USA</td>
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<td>IEPC-2015-127/ISTS-2015-b-127</td>
<td>End-to-End Testing of the PPS®5000 Hall Thruster System with a 5-kW Power Processing Unit</td>
<td>Olivier Duchemin, David Le Mehaute, Michael Öberg, Xavier Cavelan, Matthias Guilhem-Ducleon, Gaël Krimche, Frédéric Payot, Laurent Soubrier, Denis Galiana, Guillaume Gloor</td>
<td>Sncema, Safran Group, France, Airbus Defence and Space, France, Airbus Defence and Space, France</td>
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<td>IEPC-2015-128/ISTS-2015-b-128</td>
<td>The LHT-100 Hall Electric Propulsion Subsystem Development for the XY-2 Satellite</td>
<td>Li-Cheng Tian, Cheng-Ren Zhao, Ning Guo, Zuo Gu, Tian-Ping Zhang</td>
<td>Lanzhou Institute of Physics, China</td>
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<td>IEPC-2015-129/ISTS-2015-b-129</td>
<td>Trades and Challenges of Using Electric Propulsion for Active Debris Removal: the LEOSWEEP Project</td>
<td>Mercedes Ruiz, Claudio Bombardelli, Davar Feili, Anatoliy Alpatov, Andreas Neuman, Gennady Osinovyts, Baltazar Parreira, Nataliya Malysheva, Hugh Lewis, Ane Aanesland, Eduardo Aedo</td>
<td>SENER, Spain, UPM, Spain, TransMFT, Germany, ITM, Ukraine, DLR, Germany, Kuznosi EDO, Ukraine, Deimos Ingeniería, Portugal, SLC, Ukraine, R. Southampton, UK, CNRS, France, UC3M, Spain</td>
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<td>IEPC-2015-130/ISTS-2015-b-130</td>
<td>QinetiQ’s T6 and T5 Ion Thruster Electric Propulsion System Architectures and Performances</td>
<td>Mark Hutchins, Jonathan Huddleston, Javier Palencia Jiménez</td>
<td>QinetiQ, UK, Crisa, Spain</td>
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<td>IEPC-2015-133/ISTS-2015-b-133</td>
<td>8500 Hours Life Test of the QM LIPS-200 Ion Thruster</td>
<td>Tianping Zhang, Wei Meng, Hai Geng, Weiwen Zhang</td>
<td>Lanzhou Institute of Physics, China</td>
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### [b-5-4] Measurement in Cathode

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| Chairpersons       | Zhongxi Ning (Harbin Institute of Technology, China)  
|                    | Shigeru Yokota (University of Tsukuba, Japan) |

**IEPC-2015-134/ISTS-2015-b-134 (9:00 - 9:20)**  
Mitigation of Energetic Ions and Keeper Erosion in a High-Current Hollow Cathode  
Benjamin A. Jorns, Ioannis G. Mikellides, Alejandro Lopez Ortega, Dan M. Goebel  
Jet Propulsion Laboratory, California Institute of Technology, USA

Calorimetric Measurements in the Hollow Cathode  
Nikolay Koshelev, Andrey Loyan  
Zhukovsky National Aerospace University "KhA", Ukraine

Probe Measurements in the Cavity of Hollow Cathode  
Nikolay Koshelev, Andrey Loyan  
Zhukovsky National Aerospace University "KhA", Ukraine

**IEPC-2015-137/ISTS-2015-b-137 (10:00 - 10:20)**  
Measurements of Low Frequency Oscillations in a Rotating Hollow Cathode Plasma  
Taylor Matlock1, Christopher Dodson1, Dan Goebel1,2, Richard Witz1  
1University of California Los Angeles, USA, 2JPL, USA

### [b-5-5] Pulse Plasma Thruster Propellant

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| Chairpersons       | Haibin Tang (Beihang University, China)  
|                    | Tony Schoenherr (The University of Tokyo, Japan) |

Influence of Electrode Configuration of a Liquid Propellant PPT on Its Performance  
Kinya Miyagi1, Shotaro Kuroki1, Takenu Tagawa1, Soichi Masu2, Akira Kakami3, Takeshi Tachibana1  
1Kyushu Institute of Technology, Japan, 2National College of Technology, Miyakonojo College, Japan, 3University of Miyazaki, Japan

Use of Liquid Propellants in Pulsed Plasma Thrusters for Small Satellites  
William Yeong Liang Ling, Hiroki Kozumi, Tony Schönher  
The University of Tokyo, Japan

**IEPC-2015-140/ISTS-2015-b-140 (9:40 - 10:00)**  
Discharge Characteristics of a Gas-Fed Short-Pulse Plasma Thruster  
Hiroshi Hosokawa, Nao Akashi, Kouta Matsubara, Haruna Hasegawa, Hideyuki Horigawa  
Tokai University, Japan

**IEPC-2015-141/ISTS-2015-b-141 (10:00 - 10:20)**  
Time-Of-Flight Spectrometry and Performance of a Pulsed Plasma Thruster with Non-Volatile Propellant  
Serge Barral1, Jacek Kurzyzna2, Agnieszka Szlezecka2, Hubert Rachubirski2, Dariusz Daniko2, Ricardo Martin3, Pablo Ortiz4, Yann Mabilard5, Ana Zaldivar6, Christophe Koppel7, et al  
1QuinteScience, Poland, 2IPPLM, Poland, 3JMP Ingenieros, Spain, 4NASP, Spain, 5Mecartex, Switzerland, 6NanoSpace, Sweden, 7KopooS, France

### [b-5-6] Propulsion Powered by Onboard Lasers

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<tr>
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</table>
A Laser-Electrostatic Hybrid Thruster
Ryo Edamura, Akihiro Osamura, Kenta Hara, Hideyuki Horisawa
The University of Tokai, Japan

Low-Noise Thrust Generation by Laser-Ablative Micropropulsion
Stefan Scharring, Stephanie Karg, Raoul-Amadeus Lorbeer, Nancy Dahms, Hans-Albert Eckel
German Aerospace Center (DLR), Germany

Assessment of a Spherical Star Sail Concept for Interstellar Transit
John E. Sinko, Tyler A. Baxter
Saint Cloud State University, USA

A Feasibility and Design Study of Utilizing High-Power Lasers for MPD Thrusters
Thomas C. Millen
American Military University, USA

Development of an Alternating Electric Field Accelerator for Laser-Ablation Plasma Acceleration
Akihiro Osamura, Ryo Edamura, Kenta Hara, Hideyuki Horisawa
University of Tokai, Japan

Thrust Measurements and Propellant Characterization of an Electrospray Thruster
Andrea Hsu-Schouten, Brian Brady, John DeSain, Thomas Curtiss, Paulo Lozano
1The Aerospace Corporation, USA, 2Space Propulsion Laboratory, USA

Performance Results of Electrospray Thrusters Implemented in a Magnetically Levitated Thrust Balance
Fernando Mier-Hicks, Paulo C. Lozano
Massachusetts Institute of Technology, USA

Design and Characterization of a Scalable Ion Electrospray Propulsion System
David Krejci, Andrea Hsu, François Martel, Paulo Lozano, et al.
1Massachusetts Institute of Technology, USA, 2The Aerospace Corporation, USA, 3Espace Inc., USA

Isolating the Effects of Magnetic Surface Stress during Electrospray of an Ionic Liquid Ferrofluid
Kurt J. Trehune, Brandon A. Jackson, Lyon B. King, Nirmesh Jain, Brian S. Hawkett
1Michigan Technological University, USA, 2University of Sydney, Australia

Hall Thruster Characterization (2)

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Chairpersons

Alec Gallimore (University of Michigan, USA)
Kazuo Uematsu (IHI, Japan)

IEPC-2015-151/ISTS-2015-b-151 (11:00 - 11:20)

Research and Development of High-Power, High-Specific-Impulse Magnetic-Layer-Type Hall Thrusters for Manned Mars Exploration

Yuya Takahata, Tetsuo Nakuma, Taisuke Kagota, Masato Nishida, Tomoyuki Ikeda, Hirokazu Tahara

Osaka Institute of Technology, Japan


Current-Voltage Characterization of the M-173 Hall Thruster

R. Spektor1, K. D. Diamant1, H. Kamhawi2

1The Aerospace Corporation, USA, 2NASA, Glenn Research Center, USA

IEPC-2015-153/ISTS-2015-b-153 (11:40 - 12:00)

Performance Characteristics of High-Power, High-Specific-Impulse Anode-Layer-Type Hall Thrusters for In-Space Propulsion

Taisuke Kagota, Yuya Takahata, Tetsuo Nakuma, Masato Nishida, Tomoyuki Ikeda, Hirokazu Tahara

Osaka Institute of Technology, Japan

IEPC-2015-154/ISTS-2015-b-154 (12:00 - 12:20)

Experimental Study of a High Specific Impulse Plasma Thruster PlaS-120CM

Mira Potapenko1, Vladimir Gopanchuk1, Denis Merkuriev2, Pavel Smimov2

1FSUE EDB Fakel, Russia, 2RIAME, Russia


Wear Testing of a Magnetically Shielded Hall Thruster at 2000 s Specific Impulse

M. Sekerak, R. Hofer, J. Polk, B. Jorns, I. Mikellides

Jet Propulsion Laboratory, California Institute of Technology, USA

IEPC-2015-156/ISTS-2015-b-156 (11:00 - 11:20)

Test Procedure for Locally Assessing Potential Risks of Sputter Damage Due to Thruster Plumes

Markus Piechotka1, Vladislav V. Nigmatzyanov1, Kristof Holste1, Torsten Henning1, Andreas Neumann2, Klaus Hannemann1,2, Peter J. Klar1

1Justus Liebig University Giessen, Germany, 2DLR Goettingen, Germany


Effect of Plasma Plume on CubeSat Structures as a Function of Thrust Vectoring

Andrew Hine, Kristina Lemmer

Western Michigan University, U.S.A.

IEPC-2015-158/ISTS-2015-b-158 (11:40 - 12:00)

Experimental and Theoretical Investigation of Hollow Cathode Location on the Performance of a Prototype RF Ion Thruster

Nazli Turan, Sina Jahanbakhsh, Murat Celik

Bogazici University, Turkey

IEPC-2015-159/ISTS-2015-b-159 (12:00 - 12:20)

Investigation of Electron Extraction from a Microwave Discharge Neutralizer for a Miniature Ion Propulsion System

Yoshinori Takao1, Hiroyuki Koizumi2, Yusuke Kasagi2, Kimiya Komurasaki2

1Yokohama National University, Japan, 2The University of Tokyo, Japan


Backflow of Charged Particles onto a Spacecraft in Operation of Ion Thrusters under Lack of the Neutralization

Takanobu Muranaka1, Kento Hoshi2, Hirotugu Kojima2, Hiroshi Yamakawa3, Satoshi Hosoda3, Kazutaka Nishiyama2

1Chukyo University, Japan, 2Kyoto University, Japan, 3JAXA, Japan

IEPC-2015-161/ISTS-2015-b-161 (12:40 - 13:00)

Modeling and Experimental Results of the Interaction between Magnetic Fields Induced by an RF Ion Thruster and Passive Stabilization
### [b-6-4] Cathode Development (1)

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</table>
| Chairpersons       | Jan-Patrick Porst (Airbus DS GmbH, Germany)  
                      Hiroki Watanabe (Tokyo Metropolitan University, Japan) |


#### Development of a Low Current Heaterless Hollow Cathode for Hall Thrusters

Dan Lev¹, Gal Alon¹, Dima Mikitchuk¹, Leonid Appel¹

Rafael Advanced Defense Systems Ltd., Israel


#### Development of a Low Temperature Cathode Thermal Test Facility

Daniel Katz Franco¹, Dan Lev²

¹Technion Israel Institute of Technology, Israel, ²Rafael Advanced Defense Systems Ltd., Israel

**IEPC-2015-165/ISTS-2015-b-165 (11:40 - 12:00)**

#### Development of Self-Heated Cathode for Low Power Hall Thrusters

F. Scortecci, L. Sestini, S. Scaranzini, F. Moneti

Aerospazio Tecnologie s.r.l., Italy

**IEPC-2015-166/ISTS-2015-b-166 (12:00 - 12:20)**

#### 1-A Class Microwave Discharge Cathode using Impregnated Tungsten

Yoshitaka Tani¹, Ryudo Tsukizaki², Daiki Koda¹, Satoshi Hosoda², Hitoshi Kuninaka²

¹University of Tokyo, Japan, ²Japan Aerospace Exploration Agency, Japan

### [b-6-5] Applied Field MPD Thruster

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</table>
| Chairpersons       | Yu Daren (Harbin Institute of Technology, China)  
                      Yoshihiro Okuno (Tokyo Institute of Technology, Japan) |


#### Acceleration of a Plasma Flow in a Magnetic Laval Nozzle Applied to an MPD Thruster

Yohei Kobayashi, Kiyotaka Suzuki, Hiroaki Nabuchi, Atsushi Komuro, Kazunori Takahashi, Akira Ando

Tohoku University, Japan


#### Applied-Field MPD Thruster with Magnetic-Contoured Anodes

Tatsuya Kimura¹, Kohei Kojima¹, Masaki Yasui¹, Daisuke Ichihara², Tomoki Uno², Hisashi Kataoka², Akira Iwakawa², Akihiro Sasoh², Shigenu Yokota³

¹Mitsubishi Heavy Industries, Ltd., Japan, ²Nagoya University, Japan, ³University of Tsukuba, Japan

**IEPC-2015-170/ISTS-2015-b-170 (11:40 - 12:00)**

#### Investigation of Electrode Voltage Frequency Spectrum in the Onset Transition Region of a 30kW Steady-State Lithium AF-MPDT

Michael A. Hepler, William J. Coogan, Edgar Y. Choueiri

Princeton University, USA


#### Operation Characteristics of Small-DC-Current, Applied-Field MPD Thruster

Daisuke Ichihara, Tomoki Uno, Hisashi Kataoka, Jaehun Jeong, Akira Iwakawa, Akihiro Sasoh

Nagoya University, Japan


#### Improved Target Method for AF-MPDT Thrust Measure

Baojun Wang, Haitin Tang, Mengdi Kong, Yue Xu, Zhang zun
### [b-6-6] Energy Beaming Propulsion

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<td>Chairpersons</td>
<td>John E Sinko (Saint Cloud State University, USA)</td>
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<td>Yasuhsa Oda (Japan Atomic Energy Agency, Japan)</td>
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**Thrust Generation of Laser Ablation in Helium and Argon Ambient Gases with Repetitive Laser Pulses**

Bin Wang, Hisashi Tsuruta, Zhongyuan Wang, Akihiro Sasoh
Nagoya University, Japan


**Study of Laser-Supported Detonation Threshold using Graphical Analysis**

Hiroyuki Shiraishi, Yuji Matsumoto
Daido University, Japan

#### IEPC-2015-175/ISTS-2015-b-175  (11:40 - 12:00)

**Simulation of LSD Wave Characteristics in Ar and N2 using a 1-D Laser-Induced Discharge Model Coupled with Hydrodynamic Relations for Laser-Propelled Thruster Studies**

Joseph A. Ofosu¹, Kohei Matsui¹, Kimiya Komurasaki¹, Kohei Shimamura², Hiroyuki Koizumi¹

¹The University of Tokyo, Japan, ²University of Tsukuba, Japan

#### IEPC-2015-176/ISTS-2015-b-176  (12:00 - 12:20)

**Thrust Performance of Microwave Rocket at Low Ambient Pressure**

Masayuki Takahashi, Naofumi Ohnishi
Tohoku University, Japan


**Acceleration of a Projectile with a High-Power Laser-Produced Magnetic Field**

T. Morita¹, N. Saito¹, R. Kawashima¹, N. Yamamoto¹, S. Fujoka², H. Nakashima¹

¹Kyushu University, Japan, ²Osaka University, Japan

### [b-7-1] Thrusters for Microsatellites: Electrospray Thruster (2)

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<tr>
<td>Chairpersons</td>
<td>Andrea Grace Hsu (The Aerospace Corporation, USA)</td>
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<td>Hanuki Takegahara (Tokyo Metropolitan University, Japan)</td>
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</table>


**Electrical Double Layers in Electrospray Propulsion**

Kento Masuyama, Paulo Lozano
Massachusetts Institute of Technology, USA


**The Effects of Metastable Solvated Ions on Electrospray Ion Thruster Efficiency**

Catherine Miller, Paulo Lozano
Massachusetts Institute of Technology, USA

#### IEPC-2015-180/ISTS-2015-b-180  (15:40 - 16:00)

**Study of Propellant Chemical Stability in an Ionic Liquid Ferrofluid Electrospray Thruster**

Amanda J. O'Toole, Lyon B. King
Michigan Technological University, USA

#### IEPC-2015-181/ISTS-2015-b-181  (16:00 - 16:20)

**Characterization of Field Influence on Ionic Liquid Ferrofluid Electrospray Divergence Angle**

Brandon Jackson, Brad King
### [b-7-2] Hall Thruster Characterization (3)

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<tr>
<td>Chairpersons</td>
<td>Yevgeny Raitses (Princeton University, USA)</td>
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<td>Kenji Fuchigami (IHI, Japan)</td>
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</table>


**Optimization of the Design of a Wall-Less Hall Thruster**
S. Mazouffre, S. Tsikata, J. Vaudolon
CNRS, ICARE, Orleans, France


**Initial Results for a Modular 6-kW Class Hall Thruster**
M.W. Crofton, B.M. Plecque, K.D. Diamant, R. Spektor, J.A. Young, W.A. Cox
The Aerospace Corporation, USA

**IEPC-2015-185/ISTS-2015-b-185 (15:40 - 16:00)**

**Development of Permanent Magnet Hall Thrusters for Applications on Future Brazilian Space Missions**
University of Brasilia, Brazil

**IEPC-2015-186/ISTS-2015-b-186 (16:00 - 16:20)**

**Development Approach and Status of the 12.5 kW HERMeS Hall Thruster for the Solar Electric Propulsion Technology Demonstration Mission**
Richard Hofer¹, Daniel Herman², James Polk¹, Hani Kamhawi², Ioannis Mikellides¹
¹Jet Propulsion Laboratory, California Institute of Technology, USA, ²NASA Glenn Research Center, USA

### [b-7-3] Ion Thruster Grid System (1)

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<td>Chairpersons</td>
<td>John Brophy (Jet Propulsion Laboratory, California Institute of Technology, USA)</td>
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<td>Satoshi Hosoda (JAXA, Japan)</td>
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</table>


**Grid Wear Analysis of a Miniature Ion Engine**
Masakatsu Nanano¹, Hiroyuki Koizumi²
¹Tokyo Metropolitan College of Industrial Technology, Japan, ²The University of Tokyo, Japan


**Three-Dimensional Analysis of Ion Optics with Deviation of the Apertures Geometry from Axial Symmetry**
Andrey Shagayda
Keldysh Research Centre, Russia


**Research and Development on Ion Optics System of 30cm Ion Thruster**
Maofan Zheng, Yongjie Huang, Fujun Tang, Tianping Zhang, Haocheng Jiang
Lanzhou Institute of Physics, China

**IEPC-2015-190/ISTS-2015-b-190 (16:00 - 16:20)**

**Study on the Comparison of Ion Beam Divergence Characteristics and Grid Erosion between Two-Grid and Three-Grid Ion Thruster**
Chen Juanjuan, Zhang Tianping, Jia Yanhui, Sunmingming, Long Jianfei, Wu Xianming
Lanzhou Institute of Physics, China
### Cathode Development (2)

**Session Date:** July 8 (Wed) 15:00 – 16:40  
**Room:** Portopia Hotel, Main Building "Kitano"  
**Chairpersons:** Andrei V. Ivanov (KBKhA, Russia)  
Akira Iwakawa (Nagoya University, Japan)

| IEPC-2015-192/ISTS-2015-b-192 | 15:00 - 15:20 | 100 A Class Hollow Cathode  
Shigeru Yokota1, Kohei Kojima2, Tatsuya Kimura2, Hisashi Kataoka3, Akihiro Sasoh3  
1University of Tsukuba, Japan, 2Mitsubishi Heavy Industry, Ltd., Japan, 3Nagoya University, Japan

Alexander Daykin-Iliopoulos, Steve Gabriel, Igor Golosnoy  
University of Southampton, UK

Hiroki Watanabe, Takanori Deguchi, Chisato Takeda, Yuki Miura, Yuki Sato, Masanori Ichimura, Haruki Takegahara  
Tokyo Metropolitan University, Japan

Andrey Loyan  
Zhukovsky National Aerospace University "KhA", Ukraine

Andrey Loyan, Nikolay Koshelev, Alexander Tsaglov  
Zhukovsky National Aerospace University "KhA", Ukraine

### MPD Thruster

**Session Date:** July 8 (Wed) 15:00 – 16:40  
**Room:** Portopia Hotel, Main Building "Kikusui"  
**Chairpersons:** Mariano Andrenucci (Alta S.p.A., Italy)  
Akira Ando (Tohoku University, Japan)

Tomoya Suzuki, Norihide Koyama, Yoshikazu Sugiyama, Hisao Sakoda, Hirokazu Tahara  
Osaka Institute of Technology, Japan

Yoshikazu Sugiyama, Norihide Koyama, Tomoya Suzuki, Hisao Sakoda, Hirokazu Tahara  
Osaka Institute of Technology, Japan

William J. Coogan, Michael A. Hepler, Edgar Y. Choueiri  
Princeton University, USA

Arsad Quraishi1, Amit Kumar2  
Indian Institute of Technology Madras, India

Akira Kawasaki1, Kenichi Kubota2, Ikkoh Funaki2, Yoshiihiro Okuno1  
1University of Tokyo, Japan, 2Nagoya University, Japan
### [b-7-6] Numerical Simulation Method

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<td>Chairpersons</td>
<td>Francesco Taccogna (CNR, Italy)</td>
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</tbody>
</table>


**Modeling of High Energy Neutral Collisions with Slow Neutral Atoms**

Samuel J. Araki\(^1\), Richard E. Wirz\(^2\)

\(^1\)ERC Inc., USA, \(^2\)University of California, USA


**Benchmarks for Magnetically Aligned Meshes in Electromagnetic Plasma Thruster Simulations**

Daniel Pérez-Grande, Pablo Fajardo, Eduardo Ahedo

Universidad Carlos III de Madrid, Spain

#### IEPC-2015-206/ISTS-2015-b-206 (15:40 - 16:00)

**Hybrid Modeling of a Hall Thruster Using Hyperbolic System of Electron Conservation Laws**

Rei Kawashima, Kazuki Uemoto, Kimiya Komurasaki, Shohei Akagi, Tony Schönherr, Hiroyuki Koizumi

The University of Tokyo, Japan

### [b-8-1] Thrusters for Microsatellites: Pulse Plasma Thruster

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<td>Chairpersons</td>
<td>Alexander Reissner (FOTEC Forschungs- und Technologietransfer GmbH, Austria)</td>
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#### IEPC-2015-207/ISTS-2015-b-207 (17:00 - 17:20)

**Flowfield Simulation and Performance Prediction of Electrothermal Pulsed Plasma Thrusters Onboard Osaka Institute of Technology PROITERES Nano-Satellite Series**

Ryota Fujita\(^1\), Rikio Muraoka\(^1\), Keita Kanaoka\(^1\), Chen Huanjun\(^1\), Masato Tanaka\(^1\), Hirokazu Tahara\(^1\), Takashi Wakizono\(^2\)

\(^1\)Osaka Institute of Technology, Japan, \(^2\)High Serve, Japan


**Qualification of the Pulsed Plasma Thruster for Cubesat Propulsion (PPTCUP)**

Simone Ciariatti\(^1\), Michele Coletti\(^1\), Stephen B. Gabriel\(^2\)

\(^1\)Mars Space Ltd., UK, \(^2\)University of Southampton, UK

#### IEPC-2015-209/ISTS-2015-b-209 (17:40 - 18:00)

**R&D and Final Operation of Osaka Institute of Technology 1st PROITERES Nano-Satellite with Electrothermal Pulsed Plasma Thrusters and Development of 2nd and 3rd Satellites**

Takuya Kamimura, Yoshifumi Nishimura, Tomoyuki Ikeda, Hirokazu Tahara

Osaka Institute of Technology, Japan

#### IEPC-2015-210/ISTS-2015-b-210 (18:00 - 18:20)

**Development of Pulsed Plasma Thruster for Micro Satellite in Tokyo Metropolitan University**

Keisuke Tajiri, Shin'ya Mori, Dajiro Yamashita, Hiroki Watanabe, Hironori Sahara, Haruki Takegahara

Tokyo Metropolitan University, Japan

### [b-8-2] Hall Thruster Characterization (4)

| Session Date       | July 8 (Wed) 17:00 – 19:00 |

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\(^{1}\)Tokyo Institute of Technology, Japan, \(^{2}\)JAXA, Japan
### Session Date:
July 8 (Wed) 17:00 – 19:00

### Room:
Portopia Hotel, Main Building "Ikuta"

### Chairpersons:
- Yevgeny Raitses (Princeton University, USA)
- Kazuhiro Toyoda (Kyushu Institute of Technology, Japan)

### Theoretical and Experimental Investigations of a 5 kW Class Hall Effect Thruster
Tommaso Andreussi, Vittorio Giannetti, Andrea Leporini, Mariano Andrenucci
1Alta S.p.A., Italy, 2Università di Pisa, Italy

### Thrust Performance in Hall Thruster with Pulsating Operation
Naoji Yamamoto, Takumi Ito, Haruki Takegahara, Hiroki Watanabe, Kyoichi Kunki, Taichiro Tamida, Hiroyuki Osuga
1Kyushu University, Japan, 2Tokyo Metropolitan University, Japan, 3Mitsubishi Electric Corporation, Japan

### Investigation of Thermal Characteristics in a 1.35kW Magnetic Focus Type Hall Thruster (HEP-100MF)
Mao Wei, Shen Yan, Hu Yanlin, Wei Fuzhi
Beijing Institute of Control Engineering, China

### Development and Performance Characterization of a 5 kW Class Hall-Effect Thruster
Alexey Arkhipov, Cosimo Ducci, Mariano Andrenucci
Alta S.p.A., Italy

### First Tests of the KLIMT Thruster with Krypton Propellant at the IPPLM PlaNS Laboratory
Jacek Kurzyna, Dariusz Daniko, Agnieszka Szelecka
Institute of Plasma Physics and laser Microfusion, Poland

### Investigation of the Geometry Configuration Variations on the Performance of Ion Thruster Grids with PIC-DSMC Simulations
Firat Sik, Emre Turkoz, Murat Celik
1Bogazici University, Istanbul, Turkey, 2Princeton University, Princeton, USA

### Experimental Investigation of Particles Fluxes to the Grid Surfaces inside Ion Optic Systems
Maria Smirnova, Davar Feili, Sergey Khartov
1Moscow Aviation Institute National Research University (MAI), Russia, 2University of Southampton, UK

### Experimental and Theoretical Investigation of the LIPS-200 Ion Thrusters' Accelerator Grid's Lifetime
Chen Juanjuan, Zhang Tiangping, Meng Wei, Jia Yanhui, Wu Xianming
Lanzhou Institute of Physics, China

### Spatially-Resolved Erosion Rates for NEXT Optics: Throttle Point and Facility Effects
M.W. Crofton, M.J. Patterson
1The Aerospace Corporation, USA, 2NASA Glenn Research Center, USA
Plume Plasma Measurements of a 20-cm Xenon Ion Thruster using a Multiple-Probe Array
Zun Zhang1, Haibin Tang1, Jue Wang2, Min Wang2, Zheng Wen2
1Beihang University, China, 2Institute of Telecommunication Satellite CAST, China

International Electric Propulsion Conference

Simulation of the QinetiQ T6 Engine Ion Optics and Comparison to the Experimental Data
M. Coletti
Mars Space Ltd., UK

Power Processing Units- Activities in Europe 2015
Matthias Gollot1, Andreas Franke1, Waldemar Dechen2, Ulrich Schwab2, Guillaume Giorlue3, Michael Boss4, Nicoletta Wagner5, Javier Palencia6, Paolo Galantini6, Giovanni Tuccio7, Eric Bourguignon8
1European Space Agency Netherlands ASP, The Netherlands, 2ASP GmbH, Germany, 3Airbus DS, France, 4Airbus DS, Germany, 5CRISA, Spain, 6Selex ES, Italy, 7Sdael, Italy, 8Thales Alenia Space Belgium, Belgium

Development of a Low Pressure Self-Propelled Vapor Supply Subsystem for Electric Propulsion
Hou-Yi Lee, Koichi Ushio, Naoyi Yamamoto, Hideki Nakashima
Kyushu University, Japan

IEPC-2015-229/ISTS-2015-b-229 (17:00 - 17:20)
Performance Characteristics of Low-Performance Arcjet Thrusters using Low –Toxicity Propellants of HAN
Yuki Fukutome1, Suguru Shiraki1, Kazuma Matsumoto1, Fumihiro Inoue1, Hirokazu Tahara1, Yuichiro Nogawa2, Ai Momozawa3
1Osaka Institute of Technology, Japan, 2Saito, Japan, 3Tokyo City University, Japan

Performance Characteristics of Low-Power Arcjet Thruster Systems with Gas Generators for Water
Suguru Shiraki1, Yuki Fukutome1, Fumihiro Inoue1, Kazuma Matsumoto1, Hirokazu Tahara1, Yuichiro Nogawa2, Ai Momozawa3
1Osaka Institute of Technology, Japan, 2Saito, Japan, 3Tokyo City University, Japan

IEPC-2015-231/ISTS-2015-b-231 (17:40 - 18:00)
Performance and Thermal Characteristics of High-Power Hydrogen Arcjet Thrusters with Radiation-Cooled Anodes for In-Space Propulsion
Fumihiro Inoue, Yuki Fukutome, Suguru Shiraki, Kazuma Matsumoto, Hirokazu Tahara
Osaka Institute of Technology, Japan

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| July 8 (Wed) 17:00 – 18:40 | Portopia Hotel, Main Building "Waraku" | Christoph Eichhorn (Leibniz-Institute of Surface Modification, Germany)  
|                   |                              | Shunjiro Shinohara (Tokyo University of Agriculture and Technology, Japan)  |
| July 9 (Thurs) 9:00 – 10:40 | Kobe International Conference Center, ASTROSACLE Main Hall |  
|                  |                              | Ralf Heidemann1, Angelo Genovese1, Jens Haderspeck1, Alexey Lazurenko1, Benjamin van Reijen1, Stefan Weiss1, Peter Holtmann1, Klaus Ruf2, Norbert Püttmann2  
|                  |                              | 1Thales Deutschland GmbH Business Unit Electron Devices, Germany, 2Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR) - Raumfahr-Agentur, Germany  |


**Design of the Xenon Very High Temperature Resistojet**

Naoto Yanagida, Makoto Ohata, Tatsuya Yamada, Hideyuki Horisawa  
Tokai University, Japan


**Characterization of Corona Ionization Based Micro-Thrusters**

William Wright, Philippe Ferrer  
The University of the Witwatersrand, South Africa

**IEPC-2015-235/ISTS-2015-b-235 ( 17:00 - 17:20 )**

**Full Ion Velocity Distribution Function Measurement in an Electric Thruster, using LIF-Based Tomographic Reconstruction**

Paul-Quentin Elias1, Felix Cannat1, Julien Jarrige1, Denis Packan1, Alexandra Bulit2  
1Onera - the French Aerospace Lab, France, 2ESA - ESTEC, the Netherlands


**Measurement of Forces Due to Sputtering of Solid Surfaces**

Alexander Speithmann, Thomas Trottenberg, Holger Kersten  
University of Kiel, Germany


**Molecular Plasma Dynamics of Ionic Liquids when Subjected to Plasma Discharges**

Greg A. Neff, Kristina K. Lemmer  
Western Michigan University, USA


**Accuracy Analysis of a Thrust Vector Ion Beam Scanner**

Ralf Heidemann1, Angelo Genovese1, Jens Haderspeck1, Alexey Lazurenko1, Benjamin van Reijen1, Stefan Weiss1, Peter Holtmann1, Klaus Ruf2, Norbert Püttmann2  
1Thales Deutschland GmbH Business Unit Electron Devices, Germany, 2Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR) - Raumfahr-Agentur, Germany


**New Design of RPA for High Accuracy and High Resolution Measurements on μN-RIT using the Propellant Adamantane instead of Noble Gases**

Peter E. Köhler1, Waldemar Gärtner1, Hans Leter2, Peter J. Klaś1, Bruno K. Meyer1  
1Justus-Liebig-University of Giessen, Germany, 2AIRBUS Defence and Space, Germany

**[b-8-6] Diagnostics**

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| July 8 (Wed) 17:00 – 18:40 | Portopia Hotel, Main Building "Waraku" | Christoph Eichhorn (Leibniz-Institute of Surface Modification, Germany)  
|                   |      | Shunjiro Shinohara (Tokyo University of Agriculture and Technology, Japan)  |


**An Al-Water Fed DC Arcjet**

Naoto Yanagida, Makoto Ohata, Tatsuya Yamada, Hideyuki Horisawa  
Tokai University, Japan


**Characterization of Corona Ionization Based Micro-Thrusters**

William Wright, Philippe Ferrer  
The University of the Witwatersrand, South Africa

**[b-8-6] Diagnostics**

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|                   |      | Shunjiro Shinohara (Tokyo University of Agriculture and Technology, Japan)  |

**IEPC-2015-235/ISTS-2015-b-235 ( 17:00 - 17:20 )**

**Full Ion Velocity Distribution Function Measurement in an Electric Thruster, using LIF-Based Tomographic Reconstruction**

Paul-Quentin Elias1, Felix Cannat1, Julien Jarrige1, Denis Packan1, Alexandra Bulit2  
1Onera - the French Aerospace Lab, France, 2ESA - ESTEC, the Netherlands


**Measurement of Forces Due to Sputtering of Solid Surfaces**

Alexander Speithmann, Thomas Trottenberg, Holger Kersten  
University of Kiel, Germany


**Molecular Plasma Dynamics of Ionic Liquids when Subjected to Plasma Discharges**

Greg A. Neff, Kristina K. Lemmer  
Western Michigan University, USA


**Accuracy Analysis of a Thrust Vector Ion Beam Scanner**

Ralf Heidemann1, Angelo Genovese1, Jens Haderspeck1, Alexey Lazurenko1, Benjamin van Reijen1, Stefan Weiss1, Peter Holtmann1, Klaus Ruf2, Norbert Püttmann2  
1Thales Deutschland GmbH Business Unit Electron Devices, Germany, 2Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR) - Raumfahr-Agentur, Germany


**New Design of RPA for High Accuracy and High Resolution Measurements on μN-RIT using the Propellant Adamantane instead of Noble Gases**

Peter E. Köhler1, Waldemar Gärtner1, Hans Leter2, Peter J. Klaś1, Bruno K. Meyer1  
1Justus-Liebig-University of Giessen, Germany, 2AIRBUS Defence and Space, Germany
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<tr>
<th>IEPC-2015-242/ISTS-2015-b-242 ( 11:40 - 12:00 )</th>
<th>Experimental Geometry Investigation of a Coaxial ECR Plasma Thruster</th>
<th>Felix Cannat1,2, Julien Jaruge1, Trevor Lafleur1,2, Paul-Quentin Elia3, Denis Packan1</th>
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<tr>
<th>IEPC-2015-244/ISTS-2015-b-244 ( 12:20 - 12:40 )</th>
<th>A Compact Helicon Thruster for CubeSat Applications</th>
<th>David Biggs, Sam Avery, Luke Raymond, Wei Liang, Nicolas Gascon, Andrea Fabris, Juan Rivas, Mark Cappelli</th>
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| [b-10-2] Hall Thruster Erosion & Lifetime (1) | | |
| Room                                            | | |
| Chairpersons                                   | | |

| IEPC-2015-246/ISTS-2015-b-246 ( 11:00 - 11:20 ) | | |
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| Room                                            | | |
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| IEPC-2015-248/ISTS-2015-b-248 ( 11:40 - 12:00 ) | | |
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| IEPC-2015-249/ISTS-2015-b-249 ( 12:00 - 12:20 ) | | |
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| Room                                            | | |
| Chairpersons                                   | | |

| IEPC-2015-251/ISTS-2015-b-251 ( 12:40 - 13:00 ) | | |
| Room                                            | | |
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| Chairpersons                                   | | |
### Hall Thruster Simulation (1)

**Session Date**  
July 9 (Thurs) 11:00 – 13:00

**Room**  
Portopia Hotel, Main Building "Nunobiki"

**Chairpersons**  
Eduardo Fernandez (Eckerd College, Saint Petersburg, USA)  
Yoshihiro Kajimura (National Institute of Technology, Akashi, Japan)

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<th>Session</th>
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<th>Authors</th>
<th>Affiliations</th>
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<tbody>
<tr>
<td>IEPC-2015-250/ISTS-2015-b-250 (11:00 - 11:20)</td>
<td>Simulation of a Nested Channel Hall Thruster</td>
<td>Horatiu C. Dragnea, Iain D. Boyd</td>
<td>University of Michigan, USA</td>
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<tr>
<td>IEPC-2015-252/ISTS-2015-b-252 (11:40 - 12:00)</td>
<td>Hybrid-PIC Modeling of the Transport of Atomic Boron in a Hall Thruster</td>
<td>Brandon D. Smith1, Hani Kamhawi2, Iain D. Boyd1</td>
<td>1University of Michigan, USA, 2NASA Glenn Research Center, USA</td>
</tr>
<tr>
<td>IEPC-2015-254/ISTS-2015-b-254 (12:20 - 12:40)</td>
<td>Hall2De Simulations of a Magnetically Shielded 12.5-kW Demonstration Unit in Support of Hall Thruster Life Qualification for the NASA SEP TDM</td>
<td>Ioannis G. Mikellides1, Richard R. Hofer1, James E. Polk1, Hani Kamhawi2</td>
<td>1Jet Propulsion Laboratory, California Institute of Technology, USA, 2NASA John Glenn Research Center, USA</td>
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</table>

### Sensitive Thrust Stand

**Session Date**  
July 9 (Thurs) 11:00 – 13:00

**Room**  
Portopia Hotel, Main Building "Kitano"

**Chairpersons**  
Matthias K.H. Gollor (European Space Agency, the Netherlands)  
Hideyuki Horisawa (Tokai University, Japan)

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<td>IEPC-2015-256/ISTS-2015-b-256 (11:00 - 11:20)</td>
<td>Fruition of Thrust Evaluation in High Frequency Thrust Variation by Means of Active Control</td>
<td>Akira Kakami, Kenji Kashihara, Shota Takeshida, Yasuyuki Yano</td>
<td>University of Miyazaki, Japan</td>
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<tr>
<td>IEPC-2015-257/ISTS-2015-b-257 (11:20 - 11:40)</td>
<td>Low Drift Thrust Balance with High Resolution</td>
<td>Hans-Peter Harmann1, Heiko Dartsch1, Ellen Werner2</td>
<td>1AST Advanced Space Technologies GmbH, Germany, 2Deutsches Zentrum für Luft- und Raumfahrt e.V.(DLR), Germany</td>
</tr>
<tr>
<td>IEPC-2015-258/ISTS-2015-b-258 (11:40 - 12:00)</td>
<td>Verification of the FOTEC μN Thrust Balance at the ESA Propulsion Lab</td>
<td>Alexander Reissner1, Bernhard Seifert1, Thomas Hörbe1, Florian Plessescu1, Alexandra Bull1, Eduard Bosch Borras2</td>
<td>1FOTEC Forschungs- und Technologietransfer GmbH, Austria, 2ESA (ESTEC), The Netherlands</td>
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### [b-10-5] Electrothermal Thruster Simulation

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| Chairpersons | Igor D. Kaganovich (PPPL, Princeton University, USA)  
                Daisuke Nakata (Muroran Institute of Technology, Japan) |

IEPC-2015-262/ISTS-2015-b-262 (11:00 - 11:20)

**Demixing in the Low Power Hydrogen/Nitrogen Arcjet**

Jinyue Geng¹, Hai-Xing Wang²

¹Beijing Institute of Control Engineering, China, ²Beihang University, China


**Numerical Studies on Chemical Nonequilibrium within a Low-Power Argon Arcjet Thruster**

Fuzhi Wei¹, Yan He², Haixing Wang³

¹Beijing Institute of Control Engineering, China, ²Institute of Communication Satellite, CAST, China, ³Beihang University, China

IEPC-2015-264/ISTS-2015-b-264 (11:40 - 12:00)

**Performance Analysis and Optimization of High Power 2.45-GHz Microwave Electrothermal Thruster for Space Applications**

Rohan M Ganapathy, Anand S, Saagar M, Vivek M

Hindusthan College of Engineering & Technology, INDIA.

IEPC-2015-265/ISTS-2015-b-265 (12:00 - 12:20)

**A Thermo-Fluidic Model for a Low Power Xenon Resistojet**

Federico Romei, Angelo N Grubisic

University of Southampton, UK

IEPC-2015-266/ISTS-2015-b-266 (12:20 - 12:40)

**Global Energy Transfer Model of Microwave Induced Plasma in a MET Resonant Cavity**

Mehmet Serhan Yildiz¹, Murat Celik²

¹Turkish Air Force Academy, Turkey, ²Bogazici University, Turkey

### [b-10-6] Air-breathing Electric Propulsion

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| Chairpersons | Ji-Chul Shin (University of Ulsan, Korea)  
                Kazuma Ueno (ISASUAXA, Japan) |

IEPC-2015-268/ISTS-2015-b-268 (11:00 - 11:20)

**Characterization of Air Breathing Plasma Thrusters Fuelled by Atmospheric Mixtures Encountered in Earth Atmosphere at an Altitude of about 200 km**

Konstantinos Katsonis¹, Chloë Berenguer¹, José Gonzalez del Amo²

¹DEDALOS Ltd., Greece, ²European Space Agency, ESTEC, The Netherlands


**Air-Intake Design Investigation for an Air-Breathing Electric Propulsion System**
[b-11-1] Thrusters for Microsatellites: Miniature Ion Thruster

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<td>Torsten Henning (Justus Liebig University, Giessen, Germany)</td>
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<td>Ryudo Tsukizaki (JAXA/ ISAS, Japan)</td>
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IEPC-2015-273/ISTS-2015-b-273 ( 14:00 - 14:20 )
Iodine-Fueled Mini RF Ion Thruster for CubeSat Applications
Michael Tsay, John Frongillo, Kurt Hohman
Busek Co. Inc., USA

The RIT-μX Miniaturized Ion Engine System way to TRL 5
Christian Altmann, Hans Leiter, Ralf Kukies
Airbus DS GmbH, Germany

IEPC-2015-275/ISTS-2015-b-275 ( 14:40 - 15:00 )
Miniature Ion Thrusters: A Review of Modern Technologies and Mission Capabilities
Richard E. Wirz
University of California, USA

In-Flight Operation of the Miniature Propulsion System Installed on Small Space Probe: PROCYON
Hiroyuki Koizumi, Hiroki Kawahara, Kazuya Yaginuma, Jun Asakawa, Ryu Funase, Kimiya Komurasaki
The University of Tokyo, Japan

[b-11-2] Hall Thruster Erosion & Lifetime (2)

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<td>Olivier Duchemin (Snecm, Safran Group, France)</td>
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<td>Hirokazu Tahara (Osaka Institute of Technology, Japan)</td>
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Molecular Dynamics Computation of Steady-State Sputtering Yields of Hexagonal Boron Nitride
## [b-11-3] Hall Thruster Discharge Oscillation

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<td>Richard Hofer (Jet Propulsion Laboratory, USA)</td>
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<td>Makoto Matsui (Shizuoka University, Japan)</td>
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### IEPC-2015-283/ISTS-2015-b-283 (14:00 - 14:20)

**Breathing Mode in Hall Effect Thrusters**  
Kentaro Hara, Michael Sekerak, Iain Boyd, Alec Gallimore  
The University of Michigan, USA


**Stabilizing of Low Frequency Oscillation with Two Stages Filter in Hall Thrusters**  
Wei Liqiu¹, Li Jing¹, Han Liang¹, Yu Daren¹, Zhang Chaohai¹, He Xiaobin²  
¹Harbin Institute of Technology, China, ²Shanghai Institute of Space Power Sources, China


**High-Speed Image Analysis and Filtered Imaging of Nested Hall Effect Thruster Oscillations**  
Ethan T. Dale, Alec D. Gallimore  
University of Michigan, USA

### IEPC-2015-286/ISTS-2015-b-286 (15:00 - 15:20)

**Axial-Azimuthal Hybrid-Direct Kinetic Simulation of Hall Effect Thrusters**  
Kentaro Hara, Iain Boyd  
The University of Michigan, USA


**Study on the Coupling Intensity between Discharge Circuit and Magnetic Circuit in Hall Thrusters**  
Wei Liqiu¹, Ding Yongjie¹, Yan Shilin¹, Han Liang¹, Yu Daren¹, He Xiaobin²  
¹Harbin Institute of Technology, China, ²Shanghai Institute of Space Power Sources, China

## [b-11-4] Ion Thruster Development

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<td>Dan M. Goebel (Jet Propulsion Laboratory, USA)</td>
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<td>Kazutaka Nishiyama (JAXA, Japan)</td>
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### IEPC-2015-288/ISTS-2015-b-288 (14:00 - 14:20)

**Study on Effect of the Magnetic Circuit on the Performance of 40cm Ion Thruster(LIPS-400)**  
Xianming Wu, Tianping Zhang, Juanjuan Chen
Particle-in-cell Simulation of Potential Structure around Electric Solar Wind Sail Tethers
Kento Hoshi, Hirotsubu Kojima, Hiroshi Yamakawa
Kyoto University, Japan

Optimization of Orbital Transfer of Electrodynamic Tether Satellite by Nonlinear Programming
Ryusuke Harada, Koki Fujita, Toshiya Hanada
Kyushu University, Japan

Preparation for On-Orbit Demonstration of Electrodynamic Tether on HTV
Yasushi Ohkawa, Satomi Kawamoto, Teppei Okumura, Kentaro Iki, Yuuta Honikawa, Kazutaka Kawashima, Yoshiyuki Miura, Moto Takai, Masahito Washiya, Osamu Kawasaki, Daisuke Tsujita, Toru Kasai, Hirohiko Uematsu, Koichi Inoue
JAXA, Japan

Research and Development of Low-Power Cylindrical-Type Hall Thrusters for Nano/Micro-Satellites
Tetsuo Kakuma, Tomoyuki Ikeda, Masato Nishida, Taisuke Kagota, Yuya Takahata, Hirokazu Tahara
Osaka Institute of Technology, Japan

The Iodine Satellite (iSAT) Project Development through Critical Design Review (CDR)
John W. Dankanich1, Hani Kamhawi2, Derek Calvert1, James Szabo3
1NASA MSFC, USA, 2NASA GRC, USA, 3Busek Co., USA

Design of a CubeSat Propulsion System using a Cylindrical Hall Thruster
Lui T.C. Habl1, Paolo Gessini1, Stephen B. Gabriel2
1University of Brasilia, Brazil, 2University of Southampton, UK

Performance Evaluation of the T-40 Low-Power Hall Current Thruster
Jason D. Frieman1, Thomas M. Liu1, Mitchell L.R. Walker1, Jason Makela2, Alex Mathers2, Pete Peterson2
1Georgia Institute of Technology, USA, 2Aerojet Rocketdyne, USA

Effects of the Gas Pressure on Electron Transport in E Cross B Discharges
Yevgeny Raitses1, Andrei Smolyakov2, Igor Kaganovich1
1Princeton University Plasma Physics Laboratory, USA, 2University of Saskatchewan, Canada

XR-5 and XR-5A Hall Thruster Performance and Facility Effect Characterization
### [b-12-3] Hall Thruster Simulation (2)

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<td>Mikelides G. Ioannis (Jet Propulsion Laboratory, USA)</td>
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**IEPC-2015-311/ISTS-2015-b-311 (16:00 - 16:20)**

**Fully Two-Dimensional Particle-In-Cell Monte Carlo Collisions Model of a Wall-Less Hall Thruster**
Laurent Garrigues\(^1,2\), Stéphane Mazouffre\(^3\), Julien Vaudolon\(^3\), Sedina Tskikata\(^2\)

\(^1\)Laplace, Université de Toulouse, UPS, INPT Toulouse, France, \(^2\)CNRS, Laplace, France, \(^3\)CARE, CNRS, Orléans, France


**Characterization of Fluctuations in Hybrid Axial-Azimuthal Hall Thruster Simulations**
Eduardo Fernandez, Caleb Dowdy, Jacob Aley
Eckerd College, USA

**IEPC-2015-314/ISTS-2015-b-314 (16:40 - 17:00)**

**Pseudospectral Model for Hybrid PIC Hall-Effect Thruster Simulation**
Justin Koo\(^1\), Robert Martin\(^2\), Jonathan Tran\(^1\)

\(^1\)AFRL/RQRS, USA, \(^2\)ERC Incorporated, USA

**IEPC-2015-315/ISTS-2015-b-315 (17:00 - 17:20)**

**Dynamic Particle Weight Remapping in Hybrid PIC Hall-Effect Thruster Simulation**
Robert Martin\(^1\), Justin Koo\(^2\), Jonathan Tran\(^1\)

\(^1\)ERC Incorporated, USA, \(^2\)AFRL/RQRS, USA


**Two-Dimensional PIC Electron Guiding Center Model of a Plasma in a Hall Thruster**
Dariusz Danilko\(^1\), Serge Barral\(^2\), Benjamin Laurent\(^2\)

\(^1\)Institute of Plasma Physics and Laser Microfusion, Poland, \(^2\)QuinteScience, Poland, \(^3\)Snecma, Safran Group, France

### [b-12-4] Ion Thruster Propellant

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<td>Hans-Peter Harmann (AST Advanced Space Technologies GmbH, Germany)</td>
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**Study on Negative Ion Thruster using Fullerene Propellant**
Daiki Koda\(^1\), Hitoshi Kuninaka\(^2\)

\(^1\)The University of Tokyo, Japan, \(^2\)JAXA, Japan


**System Assessment of a Non-Conventional Solid-Based Propellant as an Alternative to Xenon for Ion Thrusters and Plasma Sources**
Cheryl Collingwood\(^1\), Davar Feili\(^2\), Ruth Bamford\(^1\), Bob Bingham\(^1\)

\(^1\)RAL Space, STFC, UK, \(^2\)University of Southampton, UK

**IEPC-2015-319/ISTS-2015-b-319 (16:40 - 17:00)**
Optical Plasma Diagnostics of a RIT-4 Ion Source Operating with Xenon, Argon or Adamantane
Julian Kaupe, Kristof Holste, Slobodan Mitic
Justus-Liebig-Universität Gießen, Germany

On the Search for Alternative Propellants for Ion Thrusters
Kristof Holste1, Jennifer Konrad1,2, Stefan Schippers1, Bruno Meyer2, Peter Klar1, Peter Schreiner1, Alfred Müller3
1Institute of Atomic and Molecular Physics, Germany, 2Institute of Physics, Germany, 3Institute of Chemistry, Germany

Feasibility Study on the Use of Adamantane as a Propellant for a Radio Frequency Ion Thruster
Waldemar Gärtner1, Peter Köhler1, Patrick Dietz1, Hans Leiter2, Peter J. Klar1, Bruno K. Meyer1
1Justus-Liebig-University of Gießen, Germany, 2Airbus Defence and Space, Germany

Low-Power Radio-Frequency Ion Thruster
Nikolay Antropov1, Ruslan Akhmetzhanov1, Albert Belogurov2, Aleksandr Bogatyi1, Pavel Dronov2, Grigory Dyakonov1, Andrey Ivanov2, Gauri Popov1, Sergey Khaitov1
1Research Institute of Applied Mechanics and Electrodynamicsof Moscow Aviation Institute (National Research University), Russia, 2OSC "Konstruktorskoe Buro Klimavtnomotiv", Russia

Spatial Profile of Ion Velocity Distribution Function in Helicon High-Density Plasma by Laser Induced Fluorescence Method
Yuriko Tanida, Daisuke Kuwahara, Shunjiro Shinohara
Tokyo University of Agriculture and Technology, Japan

Plasma Properties in the Helicon Plasma Source at the VASIMR® VX-CR
Jose Castro-Nieto1, Allan Rivera1, Juan Del Valle1, Franklin Chang-Diaz2, Mark D. Carter2, Jared P. Squire2
1Ad Astra Rocket Company, Costa Rica, 2Ad Astra Rocket Company, USA

Analysis of Plasma Impedance in Helicon Antenna Thrusters
Bin Tian1, Eduardo Ahedo1, Jaume Navarro Cavalié2
1Equipo de Propulsión Espacial y Plasmas (EP2), Universidad Carlos III de Madrid, Spain, 2Equipo de Propulsión Espacial y Plasmas (EP2), Universidad Politécnica de Madrid, Spain

Helicon Wave Profiling by Magnetic Induction Probes
Sebastián Roeses Mata, Edgar Choueiri
Princeton University, USA

Increase in Thrust of Magneto Plasma Sail using Solid or Deployable Superconducting Coil
Yoh Nagasaki1, Ikkoh Funaki2, Takesune Nakamura1, Hiroshi Yamakawa1
1Kyoto University, Japan, 2JAXA, Japan
Thrust Performance of Magneto Plasma Sail with a Magnetic Nozzle
Yoshihiro Kajimura¹, Yuya Oshio², Ikkoh Funaki², Masaharu Matsumoto³, Hiroshi Yamakawa⁴
¹National Institute of Technology, Japan, ²JAXA, Japan, ³Tokyo University, Japan, ⁴Kyoto University, Japan

Experimental and Numerical Investigation of Magnetosphere Inflation of Magnetoplasma Sail
Yuya Oshio², Kazuma Ueno¹, Tatsuro Sano², Ikkoh Funaki¹
¹JAXA, Japan, ²Shizuoka University, Japan

Preliminary Results of Multi-Coilmagnetic Sail Experiment
Kazuma Ueno¹, Yuya Oshio², Ikkoh Funaki¹, Hiroshi Yamakawa²
¹JAXA, Japan, ²Tokyo University, Japan

Improvement of the Thrust Force of the $\mu_10$ Microwave Ion Thruster by Optimizing the Potential of the Conductive Wall
Ryudo Tsukizaki¹, Ippei Nishiyama², Satoshi Hosoda¹, Kazutaka Nishiyama¹, Hitoshi Kuninaka¹
¹JAXA, Japan, ²The University of Tokyo, Japan

Development and Testing of the Hayabusa2 Ion Engine System
Kazutaka Nishiyama, Satoshi Hosoda, Kazuma Ueno, Ryudo Tsukizaki, Hitoshi Kuninaka
JAXA, Japan

Inductively Coupled Electromagnetic (ICE) Thruster for Small Spacecraft Propulsion
Anthony Pancotti¹, Philip Bangert², Anton Lebeda³, Klaus Schilling³, Jochen Schein¹
¹University of the Federal Armed Forces, Germany, ²Julius-Maximilians-Universität Würzburg, Germany, ³Apcon AeroSpace & Defence GmbH, Germany

R&D Status of the Pocket Rocket Thruster and Its Role in Future Micro-Satellites Space and Astronomical Missions
Rod Boswell, Christine Charles
[b-14-2] Hall Thruster Near-Wall Physics

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<td>Amnon Fruchtman (H.I.T.- Holon Institute of Technology, Israel)</td>
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<td>Makoto Matsui (Shizuoka University, Japan)</td>
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Plasma-Wall Interaction and Hall Thruster Microturbulence
Sedina Tsikata1, Cyrille Honoré2, Anne Honor3, Aude Pétin1, Stéphane Mazouffre1
1ICARE, Electric Propulsion team, CNRS UPR 3021, Orléans, France, 2LPP, CNRS UMR 7644, Ecole Polytechnique, Palaiseau, France, 3CPHT, CNRS UMR 7644, Ecole Polytechnique, Palaiseau, France

Excitation of Ion Acoustic Waves in Plasmas with Electron Emission from Walls
Alexander V. Khrabrov1, Dmytro Sydorenko2, Igor D. Kaganovich1, Andrei Smolyakov3, Yevgeny Raitses1
1Princeton Plasma Physics Laboratory, USA, 2University of Alberta, Canada, 3University of Saskatchewan, Canada

IEPC-2015-341/ISTS-2015-b-341 ( 11:40 - 12:00 )
Numerical Investigation of Near-Wall Particle Dynamics in Acceleration Region of Hall Thrusters
Yong Cao, Hujun Cao, Yuchuan Chu, Lu Chang, Quan Lulu
Harbin Institute of Technology, Shenzhen Graduate School, China

IEPC-2015-342/ISTS-2015-b-342 ( 12:00 - 12:20 )
Secondary Electron Emission Properties of Boron Nitride Ceramic Materials at High Temperatures
Yevgeny Raitses1, Paul Dourbal1, Rostislav Spektor2
1Princeton Plasma Physics Laboratory, USA, 2The Aerospace Corporation, USA

[b-14-3] HEMP Thruster Qualification

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<td>Ernst Bosch (Thales Electronic Systems GmbH, Germany)</td>
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<td>Daiisuke Nakata (Muroran Institute of Technology, Japan)</td>
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IEPC-2015-344/ISTS-2015-b-344 ( 11:00 - 11:20 )
Scalability of the HEMP-T Technology for Station Keeping and Orbit Raising
B. van Reijen1, S. Weis1, R. Heidemann1, A. Lazurenko1, J. Haderspeck1, A. Genovesi3, P. Holtmann1, K. Ruf2, N. Püttermann2
1Thales Deutschland GmbH, Germany, 2Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR), Germany

Overview, Qualification and Delivery Status of the HEMPT based Ion Propulsion System for SmallGEO
Stefan Weis1, Alexey Lazurenko1, Benjamin van Reijen1, Jens Haderspeck1, Angelo Genovesi1, Ralf Heidemann1, Peter Holtmann1, Klaus Ruf2, Norbert Püttermann2
1Thales Deutschland GmbH, Germany, 2Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR), Germany

IEPC-2015-346/ISTS-2015-b-346 ( 11:40 - 12:00 )
HEMP Thruster Assembly Performance with Increased Gas Tubing Lengths of Flow Control Unit
J. Haderspeck1, S. Weis1, B. van Reijen1, A. Genovesi3, A. Lazurenko1, R. Heidemann1, P. Holtmann1, K. Ruf2, N. Püttermann2
1Business Unit Electron Devices, Germany, 2Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR) - Raumfahrt-Agentur, Germany

IEPC-2015-347/ISTS-2015-b-347 ( 12:00 - 12:20 )
Qualification and Acceptance Test Results of HEMP Thruster Modules
Alexey Lazurenko1, Angelo Genovesi1, Ralf Heidemann1, Jens Haderspeck1, Benjamin van Reijen1, Stefan Weis1, Peter Holtmann1, Klaus Ruf2, Norbert Püttermann2
[b-14-4] Spectroscopic Measurement

**Session Date**
July 10 (Fri) 11:00 – 12:40

**Room**
Portopia Hotel, Main Building "Kitano"

**Chairpersons**
John Foster (University of Michigan, USA)
Ryudo Tsukizaki (JAXA/ ISAS, Japan)

IEPC-2015-348/ISTS-2015-b-348 ( 11:00 - 11:20 )
**Telemicroscopy Erosion Measurements of a 5 kW Class Hall Thruster Channel Walls**
Tommaso Andreussi1, Luca Pieri1, Riccardo Albertoni1, Mariano Andrenucci1, Olivier Duchemin2
1Alta S.p.A., Italy, 2Snecma, Safran Group, France

**Time-Synchronized Laser Induced Fluorescence Techniques for the Study of Quasi-Periodic Xenon Plasma Phenomena**
Andrea Lucca Fabris, Christopher V. Young, Mark A. Cappelli
Stanford Plasma Physics Laboratory, Stanford University, USA

IEPC-2015-350/ISTS-2015-b-350 ( 11:40 - 12:00 )
**Time-Synchronized Continuous Wave Laser Induced Fluorescence Velocity Measurements of a Hall Thruster**
Natalia MacDonald-Tenenbaum1, Christopher Young2, Andrea Lucca Fabris2, Michael Nakles3, Mark Cappelli2, William Hargus Jr.1
1Air Force Research Laboratory, USA, 2Stanford University, USA, 3ERC, Inc., USA

IEPC-2015-352/ISTS-2015-b-352 ( 12:00 - 12:20 )
**Further Development of Cavity Enhanced Thomson Scattering for Plasma Thruster Diagnostics**
Adam Friss, Azer P. Yalin
Colorado State University, USA

**Ion-Induced Electron Emission from Conducting Materials for Advanced Plasma Applications**
Marlene I. Patino, Taylor S. Matlock, Richard E. Witze
University of California, USA

[b-14-5] Magnetic Nozzle for Plasma Thruster

**Session Date**
July 10 (Fri) 11:00 – 13:00

**Room**
Portopia Hotel, Main Building "Kikusui"

**Chairpersons**
Mario Merino (Universidad Carlos III de Madrid, Spain)
Hideki Nakashima (Kyushu University, Japan)

**Hybrid Simulation of a Magnetic Nozzle: Exploring Magnetized/Demagnetized Regimes**
Jaume Navarro-Cavallé1, Eduardo Ahedo2
1Universidad Politécnica de Madrid, Spain, 2Universidad Carlos III de Madrid (EP2-UC3M), Spain

**Plasma Energy Conversion in the Expanding Magnetic Nozzle**
Min Li, Hai-bin Tang, Alena Kitaeva
Bahaung University, China

IEPC-2015-356/ISTS-2015-b-356 ( 11:40 - 12:00 )
**Particles Interaction Influence on Plume Divergence in Plasma Thruster Magnetic Nozzle**
Alena Kitaeva, Hai-bin Tang, Min Li, Guangnan Chen
Bahaung University, China

IEPC-2015-357/ISTS-2015-b-357 ( 12:00 - 12:20 )
**Quasi-One-Dimensional Particle-In-Cell Simulation of Magnetic Nozzles**
Frans H. Ebersohn1, J.P. Sheehan1, Alec D. Gallimore1, John V. Shebalin2
1University of Oklahoma, USA, 2University of Oklahoma, USA
Non-Local Electron Energy Probability Function in a Plasma Expanding along a Magnetic Nozzle
Rod Boswell1, Kazunori Takahashi2, Christine Charles1, Igor D. Kaganovich3
1The Australian National University, Australia, 2Tohoku University, Japan, 3Princeton Plasma Physics Laboratory, USA

Modeling of Magnetic Nozzle Thrusters and Application to ECR and Helicon Thrusters
Trevor Laffleur1,2, Denis Packan1, Felix Cannat1,2, Julien Jarrige1, Paul-Quentin Elias1
1Onera – The French Aerospace Lab., France, 2Laboratoire de Physique des Plasmas – CNRS, France

Test Facility Effect

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<td>Kristina M. Lemmer (Western Michigan University, USA) Kazuma Ueno (ISAS/JAXA, Japan)</td>
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IEPC-2015-360/ISTS-2015-b-360 (11:00 - 11:20)
Electric Propulsion Propellant Flow within Vacuum Chamber
Yoshinori Nakayama, Masahiro Nakamura
National Defense Academy, Japan

Molecular Outgassing and Deposition in EP Applications
Lubos Brieda
Particle In Cell Consulting LLC, USA

Pragmatic, Empirically-Derived Corrections for Facility Effects in Performance and Plume Measurements of Hall thrusters
Bryan M. Reid
The University of Michigan, USA

Qualification of the AEPD system as a Standard On-Ground Tool for Electric Propulsion Thrusters
F. Scortecci1, D. Pagano1, C. Bundesmann2, C. Eichhorn2, F. Schulze2, H. Neumann2, H. Leiter2, H. Kersten4, R. Blott5, J. Gonzales del Amo5
1Aerospace Tecnologie s.r.l., Italy, 2LHB-IIS-ITM, Germany, 3Airbus Defence & Space, Germany, 4Christian-Albrechts-Universität Kiel, Germany, 5Space Enterprise Partnership, UK, 6Ustus-Liedig-Universität Geessen, Germany, 7Centre National de la Recherche Scientifique-ICARE, France, 8ESA/ESTEC, The Netherlands

Miniaturized Propellant Feed System

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<td>Claude Boniface (CNES, France) Hiroyuki Koizumi (Research Center for Advanced Science and Technology, Japan)</td>
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A Pressurized Inert-Gas Propellant Feed System for the CubeSat Ambipolar Thruster
Timothy A. Collard, J. P. Sheehan, Alec D. Gailmore
University of Michigan, USA

Development of the Miniaturized Pressure Regulation System "mPRS"
Hans-Peter Harmann, Swenja Rothea
AST Advanced Space Technologies GmbH, Germany

Status of the Miniaturized Flow Control Unit "μFCU"
Hans-Peter Harmann1, Heiko Dartsch1, Jan-Patrick Postr2
**Small Satellite Constellation Electric Propulsion Propellant Management System**

Kalle Nordling, Antti Kestilä
Aalto University, Finland

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**Design, Development and Performance Study of Piezoelectric Microvalve for Electric Propulsion System**

Chitnis V D1, K M Shanbhouge1, M V Narasimha Prasad1, B K Venkatramu1, K Rajanna2, M. M. Nayak3

1Liquid Propulsion Systems Center, Indian Space Research Organisation, India, 2Indian Institute of Science, India, 3Center for Nano Science and Engineering, Indian Institute of Science, India

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**Hall Thruster Electron Transport (1)**

**Session Date**
July 10 (Fri) 14:00 – 15:40

**Room**
Portopia Hotel, Main Building "Ikuta"

**Chairpersons**
Mitchell Walker (Georgia Institute of Technology, USA)
Ikkoh Funaki (JAXA, Japan)

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**Influence of Phase-Energy Correlation on Electron Cross-Field Mobility in a Hall Thruster**

Dariusz Daniko1, Serge Barra2

1Institute of Plasma Physics and Laser Microfusion, Poland, 2QuinteScience, Poland

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**Instabilities, Fluctuations and Transport in Hall Thrusters: Theory and Numerical Simulations**

A. Smolyakov1, W. Frias1, I. Romadanov1, A. Koshkarov1, Y. Raitses2, I. Kaganovich2

1University of Saskatchewan, Canada, 2Princeton Plasma Physics Laboratory, USA

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**Numerical Analysis of High-Frequency Azimuthal Oscillations in Hall Thrusters**

Diego Escobar1, Eduardo Ahedo2

1Universidad Politécnica de Madrid (UPM), Spain, 2Equipo de Propulsión Espacial y Plasmas, Universidad Carlos III de Madrid (EP3), Spain

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**Theoretical Model of Large Scale Rayleigh-Taylor Instability in Hall Effect Thrusters with High Specific Impulse**

Alexander Kapulkin, Ehud Behar
Asher Space Research Institute of Technion, Israel

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**Cusped Field Thruster (1)**

**Session Date**
July 10 (Fri) 14:00 – 15:40

**Room**
Portopia Hotel, Main Building "Nunobiki"

**Chairpersons**
Satoshi Hosoda (JAXA, Japan)

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**Simulation for an Improvement of a Down-Scaled HEMP-Thruster**

Tim Brandt1,3, Thomas Trottenberg1, Rodion Groß2, Frank Jansen1, Franz Hey1, Ulrich Johann1, Holger Kensten1, Claus Braxmaier1,2

1DLR Institut für Raumfahrttechnik Bremen, Germany, 2ZHfM Bremen, Germany, 3Christian-Albrechts-Universität zu Kiel, Germany, 4Airbus D & S, Friedrichshafen, Germany

---

**Measurement of Anode Current Density Distribution in a Cusped Field Thruster**

Huan Wu, Hui Liu, Yingchao Meng, Daren Yu, Junyou Zhang, Siyu Yang
# Direct Measurement of Anode Current Density Distribution in a Cusped Field Thruster

Yingchao Meng, Hui Liu, Huan Wu, Daren Yu, Junyou Zhang, Siyu Yang  
Harbin Institute of Technology (HIT), China

# Downscaling a HEMP-T to micro-Newton Thrust Levels: Current Status and Latest Results

Franz Georg Hey1,2, Tim Brandt2,3,4, Martin Tajmar2, Ewan Fitzsimons1, Dennis Weise1, Ulrich Johann1  
1Airbus Defence and Space, Germany, 2Technische Universität Dresden, Germany, 3DLR, Germany, 4Christian-Albrechts-Universität, Germany, 5Universität Bremen, ZARM, Germany

# Influence of Series Resistors with Multi-Circle Anode on a Cusped Field Thruster

Siyu Yang, Hui Liu, Huan Wu, Daren Yu, Yingchao Meng, Junyou Zhang  
Harbin Institute of Technology (HIT), China

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### [b-15-4] Ion Thruster Advanced Concept

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</table>
| Chairpersons | Lubos Brieda (Particle In Cell Consulting LLC, USA)  
Kazutaka Nishiyama (JAXA, Japan) |

### Characterization of a Neutralizer-Free Gridded Ion Thruster

Dmytro Rafalskyi, Ane Aanesland  
Laboratoire de Physique des Plasmas (CNRS, Ecole Polytechnique, Sorbonne Universités, UPMC Univ Paris 06, Univ Paris-Sud), Ecole Polytechnique, France

### Investigation of the PEGASES Thruster Magnetic Filter via Laser Photodetachment Experiments

D. Renaud1, E. Pawelec2, S. Mazouffre1, A. Aanesland3  
1CNRS, ICARE, Orléans, France, 2University of Opole, Opole, Poland, 3Ecole Polytechnique, Palaiseau, France

### Increasing the Traditional Child-Langmuir Limited Current Density in Ion Thrusters through Plasma Potential Modification

Neil Arthur1, John Foster1, Michael Patterson2, Robert Thomas2, Chris Davis1, Eric Viges2  
1The University of Michigan, USA, 2NASA Glenn Research Center, USA, 3Electodynamic Applications, USA

### Impulse Transfer Thruster for an Ion Beam Shepherd Mission

Davar Feili1, Mercedes Ruiz2, Eduardo Ahedo3, Mario Merino3, Maria Smirnova1, Mantas Dobkevicius5  
1University of Southampton, UK, 2SENER Group, Spain, 3Universidad Carlos III, Spain

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### Helicon Thruster Performance (1)

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| Chairpersons | Vladimir Obukhov (RIAME MAI, Russia)  
Yuya Oschino (JAXA, Japan) |

### Helicon Magnetoplasmodynamic Plasma Thruster for Large Thrust and High Specific Impulse Electric Propulsion

Kazunori Takahashi, Atsushi Komuro, Akira Ando  
Tohoku University, Japan

### Limits on the Efficiency of a Helicon Plasma Thruster

Amnon Fruchtman
IEPC-2015-385/ISTS-2015-b-385 (14:40 - 15:00)

Effect of Propellant Species on Thrust Imparted by a Helicon Plasma Thruster

Aiki Chiba, Kazunori Takahashi, Atsushi Komuro, Akira Ando
Tohoku University, Japan

IEPC-2015-386/ISTS-2015-b-386 (15:00 - 15:20)

High-Density Helicon Plasma Thrusters using Electrodeless Acceleration Schemes

Daisuke Kuwahara, Shunjiro Shinhara, Takamichi Ishi, Shuhei Otsuka, Toshiki Nakagawa, Kensuke Kishi, Marie Sakata, Eiko Tanaka, Hiraku Iwaya, Kohsei Takizawa, Yusuke Tanida, Takayuki Naito, Kazuki Yano, Takahiro Nakamura, Sho Ito, Hiroyuki Nishida
Tokyo University of Agriculture and Technology, Japan


An Helicon Double Layer Type Thruster within a Double Magnetic Cusped Field Configuration

University of Brasilia, Brazil

IEPC-2015-388/ISTS-2015-b-388 (14:00 - 14:20)

First Measurements with a New 2d Far Field Beam Scanning Device at DLR's Electric Propulsion Test Facility

Andreas Neumann1, Vladislav V. Nigmatzyanov2, Klaus Hannemann1,2, Peter J. Klar2
1German Aerospace Center DLR, Germany, 2Justus Liebig University Giessen, Germany


Further Development of the TIHTUS Test Facility at IRS

Ashley Chadwick, Adam Boxbberger, Georg Herdrich
University of Stuttgart, Germany

IEPC-2015-391/ISTS-2015-b-391 (14:40 - 15:00)

Development and Commissioning of an Electric Propulsion Test Facility

Andrew Stapleton, Stephen Clark
QinetiQ, UK


Electric Propulsion Thruster Diagnostic Activities at IOM

C. Bundesmann1, C. Eichhorn1, F. Schoitz1, H. Neumann1, H.J. Leiter2, F. Scortecci3
1Leibniz-Institute of Surface Modification, Germany, 2Airbus Defence & Space, Germany, 3Aerospazio Tecnologie s.r.l., Italy

IEPC-2015-381/ISTS-2015-b-381 (14:00 – 15:20)

IEPC-2015-394/ISTS-2015-b-394 (16:00 - 16:20)

Development of a Compact Propulsion Systems for Mini-Sats Applications

F. Scortecci, F. Moneti, E. Bonelli
Aerospazio Tecnologie s.r.l., Italy


Electric Propulsion for Small Satellite-Inspector

Ivan S. Tkachenko, Vadim V. Salmin

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IEPC-2015-396/ISTS-2015-b-396 (16:40 - 17:00)
Introducing Very High Δv Capability to Nanosats and Cubesats
Alexander Reissner1, Nembo Buldri1, Bernhard Seifert1, Thomas Hörbe1, Carsten Scharlemann2
1FOTEC Forschungs- und Technologietransfer GmbH, Austria, 2The University of Applied Sciences Wiener Neustadt, Austria

IEPC-2015-491/ISTS-2015-b-491 (17:00 - 17:20)
MEPS Programme – New Horizons for Low Power EPS
Tommaso Misun1, Jacob Hirschovitz2
1ALTA Spa, Italy, 2RAFAEL Ltd. Israel

[b-16-2] Hall Thruster Electron Transport (2)

IEPC-2015-397/ISTS-2015-b-397 (16:00 - 16:20)
The Electron Diffusion into the Channel of Stationary Plasma Thruster
Alexander Veselovzorov, Alexander Pogorelov, Edward Svirsky, Vladimir Smirnov
National Research Centre, Russia

Boltzmann Transport in Hybrid PIC HET Modelling
Jonathan Tran1, Artan Qerushi1, Robert Martin1, Justin Koo2
1ERC Incorporated, USA, 2AFRL/RQRS, USA

IEPC-2015-399/ISTS-2015-b-399 (16:40 - 17:00)
Time-Resolved Laser-Induced Fluorescence Measurements in the Plume of a 6-kW Hall Thruster
Christopher Durot, Marcel Georgin, Alec Gallimore
University of Michigan, USA

IEPC-2015-400/ISTS-2015-b-400 (17:00 - 17:20)
Investigation of the Ion Transit Time Instability in a Hall Thruster Combining Time-Resolved LIF Spectroscopy and Analytical Calculations
Julien Vaudolon, Stéphane Mazouffre
CNRS-ICARE (Institut de Combustion, Aérothermique, Réactivité et Environnement), France

The Measurement of Transient Magnetic Field Strength in an Operating Hall Thruster Based on Faraday Rotation Effect
Liang Han, Liqiu Wei, Daren Yu
Harbin Institute of Technology, China

IEPC-2015-402/ISTS-2015-b-402 (17:40 - 18:00)
Hall2De Simulations with an Anomalous Transport Model Based on the Electron Cyclotron Drift Instability
Ira Katz, Ioannis G. Mikellides, Alejandro Lopez Ortega, Benjamin A. Jorns
Jet Propulsion Laboratory, California Institute of Technology, USA

[b-16-3] Cusped Field Thruster (2)

IEPC-2015-403/ISTS-2015-b-403 (16:00 - 16:20)
Research of a Cusped Field Thruster Using Different Wall Materials
Sun Guoshun, Liu Hui, Yu Daren, Chen Pengbo, Ma Chengyu

Experimental Study of the Influence of the Anode Position in a Cusped Field Thruster
Junyou Zhang, Hui Liu, Huan Wu, Daren Yu, Yingchao Meng, Siyu Yang
Harbin Institute of Technology (HIT), China

IEPC-2015-405/ISTS-2015-b-405 (16:40 - 17:00)

Initial Performance Characterisation of a Plasma Thruster Employing Magnetic Null Regions
Tom Wantock, Aaron Knoll
University of Surrey, UK

IEPC-2015-406/ISTS-2015-b-406 (17:00 - 17:20)

A Fully Kinetic and Self-Consistent Simulation of a $\mu$-HEMP -Thruster using Random Cell Scattering (RCS) for Solving the "Anomalous Electron Transport" Problem
Günter Kornfeld
Kornfeld Plasma & Microwave Consulting, Germany


Experimental Study of Hollow Anode Position Effect on Cusped Field Thruster
Chengyu Ma, Hui Liu, Daren Yu, Guoshun Sun, Pengbo Chen, Yinjian Zhao
Harbin Institute of Technology, China

IEPC-2015-408/ISTS-2015-b-408 (16:00 - 16:20)

Self-Consistent Numerical 1D/3D Hybrid Modeling of Radio-Frequency Ion Thrusters
Chris Volkmar¹,², Ubbo Ricklefs¹, Peter J. Klar²
¹University of Applied Sciences Giessen, Germany, ²University of Giessen, Germany


Analytical and Computational Model for Radio-Frequency Ion Thruster
Stepan V. Kanev, Sergey A. Khartov, Vladislav V. Nigmatzyanov
Moscow Aviation Institute (National research University), Russia

IEPC-2015-410/ISTS-2015-b-410 (16:40 - 17:00)

Comprehensive Radio – Frequency (RF) Ion Thruster Electromagnetic and Thermal Modelling
Mantas Dobkevicius¹, Johann Müller², Davar Feili¹
¹University of Southampton, UK, ²EADS Astrium GmbH, Germany

IEPC-2015-411/ISTS-2015-b-411 (17:00 - 17:20)

Radiated Emission Simulation of a RIT4
Timo Baruth, Rainer Thüringer
Technische Hochschule Mittelhessen University of Applied Sciences, Giessen, Germany

IEPC-2015-412/ISTS-2015-b-412 (16:00 - 16:20)

Performances of RF Plasma Thruster for Various Magnetic Field Configurations by Permanent Magnets
Sho Ito, Takahiro Nakamura, Hiroyuki Nishida, Shunjiro Shinohara
Tokyo University of Agriculture and Technology, Japan

Thrust Characteristics of Helicon Plasma Thrusters
S. Tonooka1, I. Funaki2, S. Iwabuchi3, T. Nakamura3, S. Shinohara3, H. Nishida3
1The Graduate University for Advanced Studies, Japan, 2Japan Aerospace Exploration Agency, Japan, 3Tokyo University of Agriculture and Technology, Japan

Towards Thrust Vector Control with a 3D Steerable Magnetic Nozzle
Mario Merino, Eduardo Ahedo
Equipo de Propulsión Espacial y Plasmas, Universidad Carlos III de Madrid, Spain

Electric Propulsion System using a Helicon Plasma Thruster
Takuya Yamazaki1, Shota Harada1, Atsushi Oishi1, Matsutaka Sasaahara1, Hirofumi Shimizu1, Teruki Baba2, Akira Uchigashima2, Daisuke Ichihara2, Akira Iwakawa2, Akihiro Sasoh2
1Mitsubishi Heavy Industries, LTD., Japan, 2Nagoya University, Japan

An Investigation into the Spectral Imaging of Hall Thruster Plumes
Michael R. Nakles1, Michael R. Holmesy2, William A. Hargus, Jr.2
1ERC, Inc., USA, 2Air Force Research Laboratory, USA

The Expansion of Plasma Plumes Generated by Clustered Electric Thrusters
Korsun A. G., Gabdullin F. F.
TSNIIMASH, Russia

An Interferometric Force Probe for Thruster Plume Diagnostic
Thomas Trottenberg, Alexander Spethmann, Holger Kersten
University of Kiel, Germany

Fluid vs PIC Modeling of a Plasma Plume Expansion
Filippo Cichocki1, Mario Merino1, Eduardo Ahedo1, Yuan Hu2, Joseph Wang2
1University of Carlos III of Madrid, Spain, 2University of Southern California (USC), USA

On the Validity of the Boltzmann Assumption for Electrons in Plasma Plume Modeling
Yuan Hu, Joseph Wang
University of Southern California, USA

Material Degradation and Lubrication

IEPC-2015-416/ISTS-2015-b-416 ( 16:00 - 16:20 )
An Investigation into the Spectral Imaging of Hall Thruster Plumes
Michael R. Nakles1, Michael R. Holmesy2, William A. Hargus, Jr.2
1ERC, Inc., USA, 2Air Force Research Laboratory, USA

The Expansion of Plasma Plumes Generated by Clustered Electric Thrusters
Korsun A. G., Gabdullin F. F.
TSNIIMASH, Russia

IEPC-2015-418/ISTS-2015-b-418 ( 16:40 - 17:00 )
Coupling between Acceleration Channel and Plume in HET
Francesco Taccogna, Pierpaolo Minelli
CNR-IMIP, Italy

IEPC-2015-419/ISTS-2015-b-419 ( 17:00 - 17:20 )
An Interferometric Force Probe for Thruster Plume Diagnostic
Thomas Trottenberg, Alexander Spethmann, Holger Kersten
University of Kiel, Germany

Fluid vs PIC Modeling of a Plasma Plume Expansion
Filippo Cichocki1, Mario Merino1, Eduardo Ahedo1, Yuan Hu2, Joseph Wang2
1University of Carlos III of Madrid, Spain, 2University of Southern California (USC), USA

IEPC-2015-421/ISTS-2015-b-421 ( 17:40 - 18:00 )
On the Validity of the Boltzmann Assumption for Electrons in Plasma Plume Modeling
Yuan Hu, Joseph Wang
University of Southern California, USA

Material Degradation and Lubrication

Session Date July 8 (Wed) 9:00 – 10:40
Room Kobe International Conference Center, Meeting Room 406
Chairpersons Tadashi Ikeda (Nagoya University, Japan)
### 2015-c-01 (9:00 - 9:20)
The Tribological and Corrosion Behavior of Electroless Ni–P/Bn(h) Composite Coating

Chih-I Hsu\(^1,3\), Gao-Liang Wang\(^2\), Ming-Der Ger\(^1\), Kung-Hsu Hou\(^1\)

\(^1\)National Defense University, Taiwan, \(^2\)Takming University of Science and Technology, Taiwan, \(^3\)National Chung Shan Institute of Science and Technology, Taiwan

### 2015-c-02 (9:20 - 9:40)
Experimental Demisability Investigation of Common Spaceflight Materials

Adam S. Pagan, Bartomeu Massuti-Ballester, Georg Herdrich

University of Stuttgart, Germany

### 2015-c-03 (9:40 - 10:00)
Theoretical Prediction of Crack Growth Rate and Residual Life in Ti/APC-2 Hybrid Composite Laminates with Single-Edged Cracks and Verification by Experiments

Ming-Hwa R. Jen, Che-kai Chang, Wei-Shiang Huang

National Sun Yat-Sen University, Taiwan

### 2015-c-04 (10:00 - 10:20)
Temperature, Prestrain and Volume Fraction Effect of Shape Memory Alloy Reinforced Composite Laminates under Low Velocity Impact

Ying-Chih Lin\(^1\), Yu-Liang Chen\(^1\), Hung-Wen Chen\(^2\)

\(^1\)National Defense University, Taiwan, \(^2\)Chung Shan Institute of Sciences and Technology, Taiwan

### 2015-c-05 (10:20 - 10:40)
The Effect of Low-Temperature Thermal Hydrogenation Processing on the Microstructural Evolution of Ti-6Al-4V Alloy

Chih Jen Tsai\(^1\), Le Min Wang\(^1\), Chi Ming Wu\(^1\), Chia Chieh Shen\(^2\)

\(^1\)National Defense University, Taiwan, \(^2\)Yuan Ze University, Taiwan

### [c-2] Material Synthesis and Treatment

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<tr>
<td>Chairperson</td>
<td>Toshio Ogasawara (JAXA, Japan)</td>
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#### 2015-c-06 (11:00 - 11:20)
Supercritical Compaction of Ultrafine Inorganic Particles

Brian J. Chow, Tzehan Chen, Yu Qiao

University of California – San Diego, USA

#### 2015-c-07 (11:20 - 11:40)
Improving the Corrosion Resistance and Hydrophobicity of Bipolar Plates in Proton Exchange Membrane Fuel Cells by Electroplated Coatings of Trivalent Chromium Carbon

Hsiang-Cheng Wang, Kung-Hsu Hou, Chen-En Lu, Ming-Der Ger

Chung Cheng Institute of Technology, Taiwan

#### 2015-c-08 (11:40 - 12:00)
Corrosion Resistance Study of Nickel-Boron Alloy Films Produced by Electroplating Technique

Chien-Rong Chang\(^1\), Kung-Hsu Hou\(^1\), Ming-Der Ger\(^1\), Gao-Liang Wang\(^2\)

\(^1\)National Defense University, Taiwan, \(^2\)Takming University of Science and Technology, Taiwan

#### 2015-c-09 (12:00 - 12:20)
Effect of Adding Low Cr content on Microstructure and Corrosion Resistance of Co-Mo Coatings Prepared by an Electroplating Process

Chia Wen Liao\(^1\), Kung Hsu Hou\(^1\), Pao Chang Huang\(^1\), Ming Der Ger\(^1\), Gao Liang Wang\(^2\)

\(^1\)National Defense University, Taiwan, \(^2\)Takming University of Science and Technology, Taiwan

### [c-3] Design and Fabrication

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<tr>
<td>Chairpersons</td>
<td>Jen R. Ming-Hwa (National Sun Yat-Sen University, Taiwan)</td>
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</table>
Optimization of Process Parameters of Pulse Electrodeposited Ni–W Coatings using Taguchi Method and Investigation of the Effect of Saccharin Addition on the Microstructural Evolution

Le Min Wang1, Chih Jen Tsai1, Chien Chung Chen2
1National Defense University, Taiwan, 2Armaments Bureau, Taiwan

Additive Manufacturing of Lunar Regolith for Extra-Terrestrial Industry Plant

Miranda Fateri1, Andreas Gebhardt1, Roland Antonius Gabrielli2, Georg Hendrich2, Stefanos Fasoulas2, Agnes Großmann2, Peter Schaufer2, Peter Middendorf2
1FH Aachen University of Applied Sciences, Germany, 2Stuttgart University, Germany

Development of Carbon-Polyimide / Foam Core Heat-Resistant-Sandwich Panel

Toshio Ogasawara1, Shingo Ayabe2, Yuichi Ishida1, Takuya Aoki1, Yasuo Kogo2
1JAXA, Japan, 2Tokyo University of Science, Japan

Coating Pressure Effects on Bending and Torsional Stiffness for Braid Coated Bi-Convex Tape Boom

Ryota Goto, Ren Fuchizawa, Nobuhisa Katsumata, Ken Higuchi
Muroran Institute of Technology, Japan

A Study on Development Test Results of a Subscale Propellant Tank

Yeong-Moo Yi, Jae-Sung Park, Jae-Suk Yoo, Cheol-Won Kong
Korea Aerospace Research Institute, Korea

Finite Element Analysis and Experimental Study of the Stress Distribution in Bolt and Ring Jointed a Micro-Satellite and Launcher

Mohammad Rezaeiha
Bu-Ali Sina University of Hamedan, Iran

A Structural Design Process of Shinen2 Probe from Concept to Launch

Bui Nam Duong, Yoshhiro Mashima, Hideyuki Fuji, Kei-ichi Okuyama
Kyushu Institute of Technology, Japan

Structural Design of the Remote Sensing Camera Prototype for the Satellite Project Condor Unam-Mai

Paulo César Becerril Gonzalez, Ricardo Arturo Vázquez Robledo
National Autonomous University of Mexico, Mexico

Ground Experiments of Deployment of Inflatable Membrane Structure of Nano-Satellite “SPROUT”

Yuki Maruki, Masahiko Yamazaki, Yasuyuki Miyazaki
Nihon University, Japan
### Session Date: July 9 (Thurs) 11:00 – 12:20

**Room**
Kobe International Conference Center, Meeting Room 406

**Chairpersons**
Takashi Akita (Chiba Institute of Technology, Japan)

**Membrane Structures**

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<td>2015-c-25</td>
<td>Estimation of Wrinkle Shapes on a Membrane by Transmittance of Elastic Waves</td>
<td>Yusuke Akaike, Tomohiro Yokozeki (The University of Tokyo, Japan)</td>
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| 2015-c-26 | Study of Asymmetric Centrifugal Deployment of Interlinked Membrane Structures | Yoji Shirasawa1, Ryota Inoue2, Tsukasa Mizumori3, Osamu Mori4  
1JAXA, Japan, 2NEC, Japan, 3Tokai University, Japan |
| 2015-c-27 | Comparison of Mechanical Properties between Planar and Curved Surface with Spiral Folding Patterns | Kei Samura1, Nobuyuki Kokawa1, Tomoyuki Miyashita1, Victor Parque1, Michihiro C. Natori2  
1Waseda University, Japan, 2Retired ISIS/JAXA, Japan |
| 2015-c-28 | Stepwise Deployments of Membrane Structure with Braided CFRP Bi-Convex Booms | Nobukatsu Okuizumi1, Shinya Hakata2, Hiroiuki Ikuta2, Michihiro Natori2, Akihito Watanabe3, Hiroshi Yamakawa3  
1JAXA, Japan, 2Waseda University, Japan, 3Sakase ArtTech Co., Japan |

### Session Date: July 9 (Thurs) 14:00 – 15:40

**Room**
Kobe International Conference Center, Meeting Room 406

**Chairpersons**
Nobuhisa Katsumata (Muroran Institute of Technology, Japan)

**High Precision Structures**

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<td>2015-c-29</td>
<td>Nonlocal Analysis of Eigenfrequencies for Pristine and Defective Carbon Nanotubes</td>
<td>Malgorzata Chwal (The Cracow University of Technology, Poland)</td>
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<td>2015-c-30</td>
<td>Design and Impact Resistant Analysis of Functionally Graded Al2O3-ZrO2 Ceramic Composite</td>
<td>Chin-Yu Huang, Yu-Liang Chen (National Defense University, Taiwan)</td>
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### [c-8] Vibration Control

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<td>Chairpersons</td>
<td>Hiraku Sakamoto (Tokyo Institute of Technology, Japan) &lt;br&gt;Yousuke Nambu (Osaka Prefecture University, Japan)</td>
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<th>New Application of Superalastic SMA Mesh Washer to a RWA Launch and On-Orbit Vibration Isolation System</th>
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<tr>
<td>Su-Hyeon Jeon(^1), Su-Eun Jang(^1), Mun-Shin Jo(^2), Hyun-Ung Oh(^1)</td>
<td>Chosun University, Korea, Samsung Thales, Korea</td>
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<tr>
<td>Seong-Chool Kwon(^1), Su-Hyeon Jeon(^1), Yong-Geun Lee(^6), Suk-Joo Kang(^2), Hyun-Ung Oh(^1)</td>
<td>Chosun University, Korea, Samsung Thales, Korea</td>
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<tr>
<th>2015-c-37 (16:40 - 17:00)</th>
<th>Windmill Torque Estimation of Spin-Type Solar Sail with Shape Control</th>
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<tr>
<td>Junji Kikuchi(^1), Toshihiro Chujo(^1), Tsubasa Mizumoto(^2), Yoji Shirasawa(^3), Osamu Mori(^3)</td>
<td>The University of Tokyo, Japan, Tokai University, Japan, JAXA, Japan</td>
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<th>2015-c-35 (17:00 - 17:20)</th>
<th>Vibration Control for Force Transmissibility Using a Flexible Mechanism in a Compliant Actuator</th>
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<td>Sanna Mareta(^1), Dunant Halim(^1), Pavel Trivailo(^2), Atanas Popov(^3)</td>
<td>The University of Nottingham Ningbo, China, Royal Melbourne Institute of Technology, Australia, The University of Nottingham, UK</td>
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### [c-9] Sensing and Measuring

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<td>Ken Higuchi (Muroran Institute of Technology, Japan) &lt;br&gt;Masahiko Yamazaki (Nihon University, Japan)</td>
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<th>Robustness Verification of High Precision Space Reflector Structural System using Robust Multiobjective Optimization</th>
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<td>Ryo Kodama(^1), Nozomu Kogiso(^1), Hiroaki Tanaka(^2)</td>
<td>Osaka Prefecture University, Japan, National Defense Academy of Japan, Japan</td>
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<th>2015-c-30 (14:20 - 14:40)</th>
<th>Cyclic Tensile Behavior of a Twisted and a Non-Twisted Quartz Fiber Cable Assembly for Deployable Large Precise Space Structures</th>
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<tr>
<td>Masahito Ueda(^1), Masanori Nunokawa(^1), Ken Goto(^2)</td>
<td>Nihon University, Japan, JAXA, Japan</td>
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<th>2015-c-31 (14:40 - 15:00)</th>
<th>Development of High Precision Reflector for Balloon-Borne Radio Telescope</th>
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<tr>
<td>Yasutaka Satou(^1), Akihiro Doi(^1), Kosei Ishimura(^1), Hiroaki Tanaka(^2), Yoshiro Ogi(^3), Ken Higuchi(^4), Yusuke Kono(^5), Kimihiro Kimura(^6)</td>
<td>JAXA, Japan, National Defense Academy, Japan, University of Tokyo, Japan, Muroran Institute of Technology, Japan, National Astronomical Observatory of Japan, Japan, Osaka Prefecture University, Japan</td>
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<th>2015-c-32 (15:00 - 15:20)</th>
<th>An Adaptive Estimation of Nonlinear Structural Deformations by Using the Ensemble Kalman Filter</th>
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<tr>
<td>Takeshi Akita(^1), Ryoji Takaki(^2), Nozomu Kogiso(^3)</td>
<td>Chiba Institute of Technology, Japan, JAXA, Japan, Osaka Prefecture University, Japan</td>
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<tr>
<td>Takayuki Okabe(^1), Nozomu Kogiso(^1), Hiraku Sakamoto(^2), Hiroaki Tanaka(^3)</td>
<td>Osaka Prefecture University, Japan, Tokyo Institute of Technology, Japan, National Defense Academy of Japan, Japan</td>
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2015-c-39 (9:00 - 9:20)
Characterization of Defects in Curved GFRP Structures Using Active Thermography
Przemysław Daniel Pastuszak, Aleksander Muc
Cracow University of Technology, Poland

2015-c-40 (9:20 - 9:40)
Vibration and Vision Sensing for End-Effector Positioning of a Flexible Robotic Manipulator
Xi Luo1, Dunant Halim1, Pavel M. Trivalo2
1The University of Nottingham Ningbo China, China, 2RMIT University, Australia

2015-c-41 (9:40 - 10:00)
Development of Realtime Dynamics Monitoring System for Flexible Plate Structure Based on Telemetry Data
Akiko Honda, Hiroki Nakanishi, Mitsushige Oda
Tokyo Institute of Technology, Japan

2015-c-42 (10:00 - 10:20)
Proposal of Connection Method for Precise Shape Measurement Data using Virtual Targets
Taku Harada, Takashi Iwasa
Tottori University, Japan

2015-c-43 (10:20 - 10:40)
Shape and Strain Measurement of Mesh Surface Using Digital Image Correlation
Hiroaki Tanaka
National Defense Academy, Japan

[c-10] Ground and In-Orbit Experiments

2015-c-44 (11:00 - 11:20)
Pneumatic Gravity Compensation System Applied to Three-Dimensional Movement of Deployable Space Structures for Ground Testing
Takuya Wada
The University of Tokyo City, Japan

2015-c-45 (11:20 - 11:40)
Deployment Experiments of Wrapping Fold Boom-Membrane Integrated Space Structures for De-Orbiting Satellites
Hiroshi Furuya1, Yasutaka Satou1,2, Hiraku Sakamoto1, Moto Takai2, Nobukazu Okuzumi1, Michihito Natori2, Ayako Torisaka1, Takashi Yokomatsu1, Hiroyasu Kurashige1, Akiti Watanabe5
1Tokyo Institute of Technology, Japan, 2JAXA, Japan, 3Tokyo Metropolitan University, Japan, 4Sakase Adtech Co., Ltd., Japan, 5Tokyo Institute of Technology, Japan

2015-c-46 (11:40 - 12:00)
Deployment Experiments on Stiffened Tri-axial Tubular CFRP Boom for Boom-Membrane Integrated Space Structures
Takashi Yokomatsu
Tokyo Institute of Technology, Japan

2015-c-47 (12:00 - 12:20)
Achievement of Long-Term On-Orbit Operation of SIMPLE Inflatable Extension Mast
Ken Higuchi1, Hiroshi Furuya2, Yasuyuki Miyazaki3, Takahira Aoki4, Choji Yoshida5, Akito Watanabe6, Kazuki Watanabe2
1Miyoran Institute of Technology, Japan, 2Tokyo Institute of Technology, Japan, 3Nihon University, Japan, 4The University of Tokyo, Japan, 5JAXA, Japan, 6Sakase Adtech Co., Ltd., Japan, 7WEL RESEARCH Co., Ltd., Japan, 8Formed under Spontaneous Interest

2015-c-48 (12:20 - 12:40)
Evaluation of On-Orbit Data inside the Inflatable Space Terrarium on the ISS
Naoko Kishimoto1, Yu Oikawa2, Mitsuhiko Nakano3, Kazuki Watanabe2, Takahira Aoki1
1Satsunan University, Japan, 2WEL Research Co., Ltd., Japan, 3The University of Tokyo, Japan
## [c-11] Thermal Deformation and Design

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| Chairpersons | Takayuki Shimoda (JAXA, Japan)  
Rikio Watanabe (Tokyo City University, Japan) |

### 2015-c-49 (14:00 - 14:20)

**Actuator Design for Space Smart Reflector to Reduce Thermal Distortion**

Kouta Goto1, Hiraku Sakamoto1, Akiya Inagaki1, Hiroaki Tanaka2, Kosei Ishimura3, Masaaki Okuma1

1Tokyo Institute of Technology, Japan, 2National Defence Academy, Japan, 3ISAS/JAXA, Japan

### 2015-c-50 (14:20 - 14:40)

**Estimation of Thermal Distortion of Reflector Formed by Truss Structure**

Takumi Nakagawa

The Tokyo City University, Japan

### 2015-c-51 (14:40 - 15:00)

**Evaluation of Thermal Strain Suppression Design of Piezoelectric Ceramic Actuators**

Tomonori Uchida1, Tadashige Ikeda1, Atsuhiko Senba1, Kosei Ishimura2

1Nagoya University, Japan, 2JAXA, Japan

## [d-1] Attitude Control of Spacecraft (1)

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| Chairpersons | Hirohisa Kojima (Tokyo Metropolitan University, Japan)  
Hao-Chi Chang (National Space Organization, Taiwan) |

### 2015-d-01 (8:40 - 9:00)

**On Port-Hamiltonian Modeling and Control of Systems with Quaternions**

Kenji Fujimoto, Yuki Matsumoto

Kyoto University, Japan

### 2015-d-02 (9:00 - 9:20)

**Real-Time Capable Nonlinear Model Predictive Controller Design for the Upper Stage of a Launch Vehicle**

Yunus Emre Arslantas, Thimo Oehlschlägel

German Aerospace Center (DLR), Germany

### 2015-d-03 (9:20 - 9:40)

**High Agility, Miniaturized Attitude Control Sensors and Actuators All-In-One Module**

Shinji Mitani, Shuhei Shigeto, Takuya Kanzawa, Koji Yamanaka

JAXA, Japan

### 2015-d-04 (9:40 - 10:00)

**Attitude Estimation and Control for Single Steerable Single Wing Satellite**

Hao-Chi Chang, Yu-Yung Lian, Wen-Lung Chian, Chiu-Der Hsiao, Chen-Tsung Lin

National Space Organization, Taiwan

### 2015-d-05 (10:00 - 10:20)

**Mission Scheduling for SAR Satellite Constellations with a Heuristic Approach**

Sujang Jo, Jaehwan Pi, Hyochoong Bang

Korea Advanced Institute of Science and Technology, Korea

### 2015-d-06 (10:20 - 10:40)

**Autonomous Fault Diagnosis and Fault Tolerant Control for Satellites under Periodic Maneuvers with SG-CMGs**

Fuuta Watanabe

Yokohama National University, Japan
## [d-2] Attitude Control of Spacecraft (2)

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<td>Takeya Shima (Mitsubishi Electric, Japan)</td>
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<td>Shin-ichiro Sakai (ISAS/JAXA, Japan)</td>
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**2015-d-07 (11:00 - 11:20)**

**Rate Damping of a Spacecraft Using One Control Moment Gyro**

Hiroki Imanishi, Yasuhiro Shoji, Katsuhiko Yamada

Osaka University, Japan

**2015-d-08 (11:20 - 11:40)**

**Passability and a Steering Law in Singular Surfaces of Control Moment Gyros**

Yuki Minamida¹, Takashi Asai², Yasuhiro Shoji³, Katsuhiko Yamada³

¹Osaka University, Japan, ²Nagoya University, Japan

**2015-d-09 (11:40 - 12:00)**

**Fault-Tolerant Steering Control Law for Adaptive-Skew Control Moment Gyros**

Torus Ozaki, Hirohisa Kojima

Tokyo Metropolitan University, Japan

**2015-d-10 (12:00 - 12:20)**

**Spacecraft Line of Sight Maneuver Control using Skew-Arrayed Two Single-Gimbal Control Moment Gyros**

Hirohisa Kojima¹, Pavel M. Trivailo², Yasuhiro Yoshimura³

¹Tokyo Metropolitan University, Japan, ²RMIT University, Australia

**2015-d-11 (12:20 - 12:40)**

**Spacecraft Attitude Control with RWs via LPV Control Theory: Comparison of Two Different Methods in One Framework**

Takahiro Sasaki, Takashi Shimomura

Osaka Prefecture University, Japan

## [d-3] Motion Estimation of Spacecraft

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<td>Hyochoong Bang (KAIST, Korea)</td>
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**2015-d-12 (15:00 - 15:20)**

**Study on Real-Time Dynamics Identification for a Small-Scale Unmanned Supersonic Airplane during Its Flight**

Masazumi Ueba, Tomoya Yamashita

Muroran Institute of Technology, Japan

**2015-d-13 (15:20 - 15:40)**

**Experimental Verification of Wide-Field-Integration of Optic Flow for State Estimation**

Naoto Kobayashi, Masataka Oishi, Yutaka Kinjo, Shinji Hokamoto

Kyushu University, Japan

**2015-d-15 (15:40 - 16:00)**

**Error Analysis of the Vector Measurements Based Attitude Determination Methods for Small Satellites**

Demet Çilden

Istanbul Technical University, Turkey

**2015-d-16 (16:00 - 16:20)**

**A Novel Relative Orbit Estimation Algorithm During the Close Asteroid Flyby**

Kaito Ariu, Takaya Inamori, Ryu Funase, Shinichi Nakasuka

The University of Tokyo, Japan

Session Date: July 7 (Tue) 17:00 – 18:20
Room: Kobe International Conference Center, Meeting Room 501
Chairpersons:
- Shinji Mitani (JAXA, Japan)
- Jozef C van der Ha (Satellite Design and Operations, USA)

2015-d-17 (17:00 - 17:20)

Utilization of a Mission Sensor in the Attitude Control Loop: On Orbit Results with HISAKI Satellite
Shin-ichiro Sakai1, Shujiro Sawai1, Kouji Nakaya1, Seisuke Fukuda1, Shinsuke Takeuchi1, Atsushi Yamazaki1, Kazuo Yoshikawa1, Go Murakami1, Fuminori Tsujiya2, Yosuke Iwayama3, Kazuhisa Tanaka3, Yasuhiro Kusakawa3, Kazuki Yokota3
1 JAXA, Japan, 2Tohoku University, Japan, 3NEC Corp., Japan

2015-d-18 (17:20 - 17:40)

Multirate Sampling Control for a Space Observatory Tip-Tilt Mirror System with Low Sampling Rate
Keita Nouchi1, Hiroshi Fujimoto1, Shin-ichiro Sakai2
1 The University of Tokyo, Japan, 2 ISAS(JAXA), Japan

2015-d-19 (17:40 - 18:00)

Attitude Dynamics and Control of Hi-Speed Spinning Sounding Rocket: Design, Implementation and Flight Result of ISAS Sounding Rocket S-520-29
Yosuke Fukushima1, Maki Shida1, Junich Nakatsuka1, Takumi Abe1, Hideyuki Miyahara2, Tatsuya Tsunoda2
1 ISAS/JAXA, Japan, 2 Baron Electronics Co., LTD., Japan

2015-d-21 (18:00 - 18:20)

Estimation of Impact Probabilities of Interplanetary Ariane Upper Stages
Rüdiger Jehn
European Space Operations Centre, ESA/ESOC, Germany

[d-5] Spacecraft Dynamics

Session Date: July 8 (Wed) 9:00 – 10:40
Room: Kobe International Conference Center, Meeting Room 501
Chairpersons:
- Takahiro Kato (Center of Applied Space Technology and Microgravity (ZARM), Germany)
- Hyochoong Bang (KAIST, Korea)

2015-d-22 (9:00 - 9:20)

Attitude Dynamics Lessons Learned from Orbiting Spinning Satellites
Jozef van der Ha
Satellite Design and Operations, USA

2015-d-23 (9:20 - 9:40)

Generic Computation Method of Free-Molecular Flow Effects on Space Objects
Takahiro Kato
Center of Applied Space Technology and Microgravity (ZARM), Germany

2015-d-24 (9:40 - 10:00)

Study and Development of Advanced Reflectivity Control Device for Spin Rate Control
Toshihiro Chujo1, Yoji Shirasawa2, Osamu Mori2, Junichiro Kawaguchi2
1 The University of Tokyo, Japan, 2 JAXA, Japan

2015-d-25 (10:00 - 10:20)

Attitude Control Model for Spinning Solar Sail Spacecraft with Reflectivity Control Capability
Takuro Furumoto
The University of Tokyo, Japan

2015-d-26 (10:20 - 10:40)

Optimal Attitude Control of a Spinning Solar Sail with Reflectivity Control Device
Kenshiro Oguri
The University of Tokyo, Japan
# Near Asteroid Dynamics

**Session Date**: July 8 (Wed) 11:00 – 12:20

**Room**: Kobe International Conference Center, Meeting Room 501

**Chairpersons**: Yasuhiro Kawakatsu (ISAS/JAXA, Japan)

Antonio Prado (National Institute for Space Research, Burkina Faso)

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<th>Institution(s)</th>
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<tr>
<td>2015-d-27</td>
<td>Dynamics and Control of a Spacecraft near Binary Asteroids</td>
<td>Pamela Woo, Arun K. Misra</td>
<td>McGill University, Canada</td>
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<td>2015-d-28</td>
<td>Planning Payload Deployment to Small Bodies via Reachability Analysis</td>
<td>David Surovik, Daniel J. Scheeres</td>
<td>The University of Colorado, USA</td>
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<td>2015-d-29</td>
<td>Comparison Study of Two Gravity Models for Asteroids</td>
<td>Xiaosheng Xin, Xiyun Hou, Lin Liu, Jingshi Tang</td>
<td>Nanjing University, China</td>
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<td>Searching for Stable Orbits around a Triple Asteroid</td>
<td>Antonio F B A Prado</td>
<td>National Institute for Space Research (INPE), Brazil</td>
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# Orbit around Lagrange Point

**Session Date**: July 8 (Wed) 15:00 – 16:40

**Room**: Kobe International Conference Center, Meeting Room 501

**Chairpersons**: Pavlo Trivailo (RMIT University, Australia)

Stefano Campagnola (ISAS/JAXA, Japan)

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<td>2015-d-31</td>
<td>Orbit Design and Control of Satellite around the L2 Point Using Tethered Anchor System</td>
<td>Kosei Ishimura1, Taisuke Kawachi2, Hiroaki Tanaka3, Hiraku Sakamoto4, Koji Tanaka5, Hiroshi Yamakawa2</td>
<td>ISAS/JAXA, Japan, Waseda University, Japan, National Defence Academy, Japan, Tokyo Institute of Technology, Japan</td>
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<td>Trajectory Design using the Centre Manifold Theory in the Circular Restricted Three-Body Problem</td>
<td>Yuki Akiyama</td>
<td>Kyushu University, Japan</td>
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<td>2015-d-33</td>
<td>Optimal Transfers between Sun-Earth Libration Point Orbits Utilizing Lunar Gravity Assists</td>
<td>Kenta Oshima, Tomohiro Yanoan</td>
<td>Waseda University, Japan</td>
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<td>2015-d-34</td>
<td>Phasing Problem for Sun-Earth Halo Orbit to Lunar Swingby Transfers</td>
<td>Hongru Chen1, Yasuhiro Kawakatsu2, Toshiya Hanada1</td>
<td>Kyushu University, Japan, ISAS/JAXA</td>
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<tr>
<td>2015-d-35</td>
<td>Several Possible Mission Orbits around Earth-Moon Triangular Libration Points</td>
<td>Xiyun Hou, Jingshi Tang, Lin Liu</td>
<td>Nanjing University, China</td>
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Simulator Design, Calibration, and Design Concept

Session Date: July 8 (Wed) 17:00 – 18:40
Room: Kobe International Conference Center, Meeting Room 501
Chairpersons: Hirohisa Kojima (Tokyo Metropolitan University, Japan), Takeya Shima (Mitsubishi Electric, Japan)

2015-d-37 (17:00 - 17:20)
**Attitude Maneuver Tests using CMGs Mounted in the Three-Axis Free Dynamics Simulator**
Takuya Kanzawa1, Misuzu Haruki1, Tatsuya Endo2, Koji Yamanaka1
1JAXA, Japan, 2JAXA, Japan (~2011)

2015-d-38 (17:20 - 17:40)
**Development of Testbed for Relative Position and Attitude Simultaneous Control Experiment using Electromagnets**
Taku Watanabe1, Ayako Torisaka1, Satoru Ozawa2, Hiroshi Yamakawa2, Hiroshi Sahara1
1Tokyo Metropolitan University, Japan, 2JAXA, Japan, 3Waseda University, Japan

2015-d-39 (17:40 - 18:00)
**Development of Attitude Control System and Testing Simulator for Microsatellite MicroDragon**
Trinh Hoang Quan1, Nguyen Son Duong2, Nguyen Van Thuc2, Le The Soat2, Cao Xuan Hiep2, Toshinori Kuwahara1, Kazuya Yoshida1, Pham Anh Tuan3
1Tohoku University, Japan, 2Keio University, Japan, 3Vietnam National Satellite Center, Vietnam

2015-d-40 (18:00 - 18:20)
**Magnetometer Calibration for Advanced Small Satellite Missions**
Halil Ersin Soken, Shin-ichiro Sakai
Institute of Space and Astronautical Science (ISAS), JAXA, Japan

2015-d-41 (18:20 - 18:40)
**Design of Novel Ground Control Station for Reusable Launch Vehicles**
Subramanian Ramasamy, Roberto Sabatini, Hideaki Ogawa, Alessandro Gardi
RMIT University, Australia
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| Chairpersons     | Takanao Saiki (ISAS/JAXA, Japan)  
|                  | Martin Schlueter (ISAS/JAXA, Japan) |

2015-d-48 (11:00 - 11:20)

**Near Earth Asteroid Deflection Mission using Coulomb Force Attractor**
Kouhei Yamaguchi, Hiroshi Yamakawa  
Kyoto University, Japan

2015-d-49 (11:20 - 11:40)

**GALLOP: A Low-Thrust Trajectory Optimization Tool for Preliminary and High Fidelity Mission Design**
Chit Hong Yam, Yasuhiro Kawakatsu  
JAXA, Japan

2015-d-50 (11:40 - 12:00)

**Performance Study of Electric Propulsion Delta-V Earth Gravity Assist (EDVEGA) for V-Infinity Leveraging**
Satoshi Ogura, Yasuhiro Kawakatsu  
1The University of Tokyo, Japan, 2JAXA, Japan

2015-d-51 (12:00 - 12:20)

**Robust Optimal Low-Thrust Trajectory Design considering Missed-Thrust**
Naoya Ozaki, Ryu Funase, Stefano Campagnola  
1The University of Tokyo, Japan, 2ISAS/JAXA, Japan

2015-d-52 (12:20 - 12:40)

**Optimal Impulsive Anti-Interception of Orbital Three Players via Particle Swarm Optimization Algorithm**
Renfu Li, Yifang Liu, Shuquan Wang  
1Huazhong University of Science and Technology, China, 2Chinese Academy of Sciences, China

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| Chairpersons     | Yasuhiro Kawakatsu (ISAS/JAXA, Japan)  
|                  | Xiyun Hou (Nanjing University, China) |

2015-d-53 (14:00 - 14:20)

**Design of Earth-Moon Cyclers by Optimal Control Theory**
Sho Hayashida  
Kyushu University, Japan

2015-d-54 (14:20 - 14:40)

**Escape Trajectories from Sun-Earth Distant Retrograde Orbits**
Yusuke Oki, Junichiro Kawaguchi  
1The University of Tokyo, Japan, 2JAXA, Japan

2015-d-55 (14:40 - 15:00)

**Many-Objective Optimization for Space Mission Analysis**
Martin Schlueter, Takeshi Watanabe, Tomoaki Tatsukawa, Akira Oyama  
Japan Aerospace Exploration Agency, Japan

2015-d-56 (15:00 - 15:20)

**Trajectory Design for Jovian Trojan Asteroid Sample Return Mission**
Takanao Saiki, Yuki Teramoto, Go Ono, Jun Matsumoto, Yoji Shirasawa, Osamu Mori, Jun'ichiro Kawaguchi  
1JAXA, Japan, 2The University of Tokyo, Japan

[d-12] Control System Design and Instruments
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| Chairpersons | Shinji Hokamoto (Kyushu University, Japan)  
Susumu Hara (Nagoya University, Japan) |

**2015-d-60 (16:00 - 16:20)**

**Launches and Captures of the Space "Frisbees": Dynamic Modelling and Simulation**

Pavel M. Trivailo, Hirohisa Kojima
1RMIT University, Australia  
2Tokyo Metropolitan University, Japan

**2015-d-59 (16:20 - 16:40)**

**Analysis of Deployment Behavior of Insect Wing-Inspired Space Inflatable Structure**

Takaaki Kikuchi, Hirohisa Kojima
Tokyo Metropolitan University, Japan

**2015-d-58 (16:40 - 17:00)**

**Robust Landing Gear by Means of on-Flying-Type MEID Mechanism**

Susumu Hara, Shintaro Matsu, Naoki Saeki, Masatsugu Otsuki
1Nagoya University, Japan  
2JAXA, Japan

**2015-d-61 (17:00 - 17:20)**

**Evaluation of Pulse Detection IC in a LIDAR System**

Takahide Mizuno, Kousuke Kawahara, Hirokazu Ikeda
The Institute of Space and Astronautical Science, JAXA, Japan

**2015-d-62 (17:20 - 17:40)**

**Experimental Model of Star Tracker for Satellite**

Suleimen Yelubayev, Bahytzhan Albazarov, Vladimir Ton, Erbol Sarsenbayev, Kuanysh Aliipbayev, Alexandr Shamro, Timur Bopeyev, Anna Sukhenko
1AALR "Institute of space technique and technology", Kazakhstan  
2CA "Kazakhstan Garysh Sapany", Kazakhstan

**2015-d-63 (17:40 - 18:00)**

**Magnetic Plasma De-Orbit System for Nano- and Micro-Satellites using a Large Magnetic Torquer**

Takaya Inamori, Rei Kawashima, Nobutada Sako, Phongsatorn Saisutjarit, Ryu Funase, Shinichi Nakasuka
1The University of Tokyo, Japan  
2Canon Electronics Inc., Japan  
3King Mongkut's University of Technology, Thailand

**2015-d-64 (18:00 - 18:20)**

**Decentralized Robust Optimal Control of Large Flexible Space Structure by Fourth-Order Local Proper Controllers Using Displacement Output**

Kengo Igawa, Yohji Kobayashi
Kobe City College of Technology, Japan

## [d-13] Orbit Determination and Modelling

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| Chairpersons | Katsuhiro Yamada (Osaka University, Japan)  
Arun K. Misra (McGill University, Canada) |

**2015-d-65 (8:40 - 9:00)**

**Performance Analysis on NORAD TLE Pre-Process Method for Low Cost ADCS MCU**

Shu-Ting Goh, Jun-Wei Chia, Shi-Tong Chin, Kay-Soon Low, Lip-San Lim
Nanyang Technological University, Singapore

**2015-d-66 (9:00 - 9:20)**

**Long-Term Orbit Prediction for Tiangong-1 Spacecraft Using the Mean Atmosphere Model**

Jingshi Tang, Lin Liu, Haowen Cheng, Songjie Hu, Jianfeng Duan
1School of Astronomy and Space Science, Nanjing University, China  
2National Astronomical Observatories, Chinese Academy of Sciences, China  
3Aerospace Flight Dynamics Laboratory, China

**2015-d-67 (9:20 - 9:40)**

**The Applicability of Semi-Analytical Method for Different Orbits in Long Term Prediction**

Dawei Wang, Jingshi Tang
Nanjing University, China
Reduced-Dynamic Models for GPS-Based Precise Orbit Determination and Their Applications to Enhanced-Accuracy Orbit Prediction

Wenbin Wang, Yang Gao
Technology and Engineering Center for Space Utilization, China

The Navigation of a Spacecraft with Differenced Radiometric Data

Tsutomu Ichikawa
JAXA, Japan

On-Board Orbit Determination using Sun Sensor and Optical Navigation Camera for Deep Space Mission

Yosuke Kawabata¹, Yasuhiro Kawakatsu²
¹The University of Tokyo, Japan, ²JAXA, Japan

Formation Flying

Session Date: July 10 (Fri) 11:00 – 12:20
Room: Kobe International Conference Center, Meeting Room 501
Chairpersons: Pavel Trivailo (RMIT University, Australia), Jingshi Tang (Nanjing University, China)

Suppression of Formation Flying Deviation in near Circular Orbits under the \( J_2 \) Perturbation

Kenji Kitamura¹, Katsuhiko Yamada², Takeya Shima¹
¹Mitsubishi Electric Corporation, Japan, ²Osaka University, Japan

Long-Distance Formation Flying of Spacecraft in Elliptic Orbits

Makoto Suminaka¹, Masaya Kimura², Katsuhiro Yamada¹
¹Osaka University, Japan, ²Mitsubishi Electric Corporation, Japan

Two-Craft Coulomb Formation Maneuver Trajectory Programming

Shuquan Wang
Chinese Academy of Sciences, China

Order-Three Analytical Solution for the Relative Motion around the Triangular Libration Points and the Application to Spacecraft Formation Flying

ZhengTao Zhang, Xiyun Hou, Lin Liu
University of Nanjing, China

Aerodynamics of Atmosphere Entry Systems (1)

Session Date: July 7 (Tue) 9:00 – 10:40
Room: Kobe International Conference Center, Meeting Room 503
Chairpersons: Hiromitsu Kawazoe (Tottori University, Japan), Masato Funatsu (Gunma University, Japan)

Influence of Attack Angle on Magnetohydrodynamic Flow Control in Reentry Flight

Katsumi Masuda, Yuta Shimosawa, Takayasu Fujino
University of Tsukuba

Results of CRYOFENIX (Cryogenic Sounding Rocket Experiment)

Vincent Leudiere¹, Benjamin Legrand¹, Sebastien Bianchi², Emilie Biotteau²
¹CNES, France, ²Séte, France
Control of Aerodynamic Characteristics of Lifting Reentry Vehicle with Applied Magnetic Field
Hirotaka Otsu
Ryukoku University, Japan

Drag Enhancement for Atmospheric Entry Capsule using Electrodynamic Effect with Multi-Magnetic Source
Yasunori Nagata, Kazuhiko Yamada, Takashi Abe
1Okayama University, Japan, 2JAXA/ISAS, Japan

Re-Evaluation of the SLIT In-Flight Data for STARDUST
Georg Herdrich, Stefanos Fasoulas, Ricarda Wernitz, Heiko Ritter
1University of Stuttgart, Germany, 2ESA-ESTEC, The Netherlands

Dynamic Stability Analysis of a Mars Entry Capsule using Large-Eddy Simulation
Shingo Matsuyama, Kazuhisa Fujita
JAXA, Japan

Development of Supersonic Parachute for Japanese Mars Rover Mission
Hiroki Takayanagi, Kazuhiiko Yamada, Yusuke Maru, Shingo Matsuyama, Kazuhiisa Fujita
JAXA, Japan

Heat Flux Measurements in Expansion Tube for Martian Entry
Satoshi Nomura, Hiroki Takayanagi, Kazuhiisa Fujita
JAXA, Japan

Numerical Analyses of Operating Characteristics of a CO2 Laser Sustained Plasma Wind Tunnel
Katsuhiro Tanaka, Hiroshi Katsurayama, Makoto Matsui, Yasuo Katoh
1Yamaguchi University, Japan, 2Shizuoka University, Japan

LES Computation of Turbulent Heat Flux on Reentry Capsule with Forced Transition
Tomoaki Ishihara, Yousuke Ogino, Naofumi Ohrishi, Ketsuke Sawada, Hideyuki Tanno
1Tohoku University, Japan, 2JAXA, Japan

Experimental Study on the Improvement of 10kW ICP Heater to Generate the Supersonic Plasma Flow
Daisuke Kawamoto, Satoshi Miyatani, Kazuhiiko Yamada, Takashi Abe, Asei Tezuka
1Waseda University, Japan, 2The University of Tokyo, Japan, 3JAXA, Japan
### [e-4] Plasma Flows

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<td>Kenji Shibusawa (National Institute of Technology, Ibaraki College, Japan) Masato Funatsu (Gunma University, Japan)</td>
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#### 2015-e-16 (17:00 - 17:20)
**Experimental Evaluation of Time-Averaged Body Force Field of DBD Plasma Actuator using PIV Measurement**
Kosuke Ota, Tsubasa Sekiya, Masaki Tamura, Hiroyuki Nishida
Tokyo University of Agriculture and Technology, Japan

#### 2015-e-17 (17:20 - 18:00)
**Optical Diagnostics of Plasma Evolution and Induced Air Flows in Dielectric Barrier Discharge Plasma Actuator**
Takuya Kibatake, Masanori Deguchi, Junya Suzuki, Yoshinori Takao, Koji Eriguchi, Kouichi Ono
Kyoto University, Japan

#### 2015-e-18 (17:40 - 18:00)
**Vectored Jet Control for Trielectrode Plasma Actuator with Serrated Electrode**
Takashi Matsuno, Masatake Sugahara, Jun Koyama, Noboru Fujita, Gouji Yamada, Hiromitsu Kawazoe
Tottori University, Japan

#### 2015-e-19 (18:00 - 18:20)
**Effect of Plasma Fluid Models on Prediction Accuracy of Electro-Hydrodynamic Thruster Performance**
Hisaichi Shibata, Yasumasa Watanabe, Kojiro Suzuki
The University of Tokyo, Japan

### [e-5] Rarefied Aerodynamics / Thermal Protection Systems (1)

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<td>Chairpersons</td>
<td>Takehru Sakai (Nagoya University, Japan) Toshiyuki Suzuki (JAXA, Japan)</td>
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#### 2015-e-21 (9:00 - 9:20)
**Investigation of Rarefaction and Condensation Effects in Hypersonic Rarefied Flows**
T. Ozawa, T. Suzuki, K. Fujita
JAXA, Japan

#### 2015-e-22 (9:20 - 9:40)
**Development of a General-Purpose Parallel Direct Simulation Monte Carlo Code (PDSC++) and its Application**
Cheng-Chin Su, Ming-Chung Lo, Jong-Shiun Wu
National Chiao Tung University, Taiwan

#### 2015-e-23 (9:40 - 10:00)
**Numerical Investigation of Alkali Metal Additive Methods for Triggering the Electrodynamic Aerobraking at Rarefied High Altitudes**
Hiroshi Katsurayama
Yamaguchi University, Japan
**Surface Coverage and Pressure Dependent Catalysis of Copper**

Bartomeu Massuti-Ballester, Georg Herdrich
University of Stuttgart, Germany

**High-Speed Compact Entry Capsule Enhanced by Lightweight Ablator and Crushable Structure**

Tetsuya Yamada, Toshio Ogasawara, Koichi Kitazono, Hideyuki Tanno
1JAXA, Japan, 2Tokyo Metropolitan University, Japan

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**Session Date**
July 8 (Wed) 11:00 – 12:40

**Room**
Kobe International Conference Center, Meeting Room 405

**Chairpersons**
Kazutaka Kitagawa (Aichi Institute of Technology, Japan)
Hiroshi Katsurayama (Yamaguchi University, Japan)

**2015-e-26 ( 11:00 - 11:20 )**

Characterisation of a Hybrid Heat Shield Solution for Planetary Entries

Bartomeu Massuti-Ballester, Adam S. Pagan, Georg Herdrich
University of Stuttgart, Germany


Empirical Study of the Lightweight Ablator Series for Transfer Vehicle Systems (LATS)

Bianca Szasz1, Ken-ichi Okuyama1, Sumio Kato2, Takayuki Shimoda3
1Kyushu Institute of Technology, Japan, 2University of the Ryukyus, Japan, 3Japan Aerospace Exploration Agency, Japan

**2015-e-28 ( 11:40 - 12:00 )**

In-Situ Ablation Measurement of a Low Density Ablator Using an Embedded Sensor

Yuuki Dantsuka1, Hirofumi Nakazawa1, Yuichi Ishida2, Kenichi Hirai3, Kazutaka Kitagawa4, Takeharu Sakai1
1Nagoya University, Japan, 2JAXA, Japan, 3IHI Aerospace, Japan, 4Aichi Institute of Technology, Japan

**2015-e-29 ( 12:00 - 12:20 )**


Sumio Kato1, Shoichi Matsuda1, Akihiro Watanabe1, Naoyuki Shimada1, Shunsuke Sakai1, Hiroaki Oya2, Kenichi Okuyama2
1University of the Ryukyus, Japan, 2Kawasaki Heavy Industries, Ltd, Japan, 3Kyushu Institute of Technology, Japan

**2015-e-30 ( 12:20 - 12:40 )**

Study of Lightweight Ablative Thermal Protection System for Mars Rover Mission

Toshiyuki Suzuki, Takuya Aoki, Yu-ichi Ishida, Toshio Ogasawara, Kazuhsa Fujita
Japan Aerospace Exploration Agency, Japan

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**[e-7] Advanced Flow Physics (1)**

**Session Date**
July 8 (Wed) 15:00 – 16:40

**Room**
Kobe International Conference Center, Meeting Room 503

**Chairpersons**
Toshiyuki Suzuki (JAXA, Japan)
Takashi Ozawa (JAXA, Japan)

**2015-e-31 ( 15:00 - 15:20 )**

Development of Two-Stage Light Gas Gun for Investigation on Dust Sampler of Mars Aero-flyby Sample Collection

Saeko Umetani1, Satoshi Nomura2, Hiroki Takayanagi2, Kazuhsa Fujita2, Makoto Matsu1
1Shizuoka University, Japan, 2JAXA, Japan


Speeding up of Shock Wave for Future Missions and Spectroscopic Measurement of Strong Shock Wave

Sayaka Nishimura1, Hiroki Takayanagi2, Satoshi Nomura2, Kazuhsa Fujita2, Makoto Matsu1
1Shizuoka University, Japan, 2JAXA, Japan
Radiation Measurements of SiC Ablations with Several Kinds of Narrow Band-Pass Filters
Gen Morikou1, Kazuhiro Tokano1, Kenta Konishi2, Masahiro Ozawa3, Masato Funatsu4
1Gunma University, Japan, 2Suzuki Motor Corporation, Japan, 3Chuo Engineering Co Ltd., Japan

Establishment of PSP Technique for Small-Scaled Model using the Supersonic Wind-Tunnel
Satoshi Koshiyama, Nobuyoshi Fujimatsu
Toyo University, Japan

Comparison of PLIF Data and Numerical Simulation in Supersonic Mixing Enhanced by a Three-Dimensional Cavity Flow
Takayuki Oka1, Fuji Akagi1, Taro Handa2, Sumio Yamaguchi3
1Fukuoka University, Japan, 2Kyushu University, Japan

Experimental Investigations on Heating Damage to Flexible Body in Hypersonic Velocity
Masato Taguchi, Ryo Manuyama, Takuma Sato, Koichi Mori
Nagoya University, Japan

Scramjet Combustion Investigation with Reacting Flow Modeling
1National Space Organization, Taiwan, 2National Chiao Tung University, Taiwan

A New Production Method for Thin Film Platinum Resistance Sensor in Shock Wave Tunnel Test
Lin Jian, Chen Xing, Gong Jian, Yao Dapeng
China Academy of Aerospace Aerodynamics, China

Effect of Laser Energy Deposition on Shock Wave-Boundary Layer Interaction
Tatsuro Shoda, Takahiro Tamba, Pham Hoang Son, Akira Iwashita, Akihiro Sasoh
Nagoya University, Japan

Control of a Supersonic Elliptic Jet
Anuj Bajpai, Ethirajan Rathakrishnan
Indian Institute of Technology Kanpur, India

Aspect Ratio Effect on Supersonic Elliptic Jet Mixing
S.M. Aravind Kumar, E. Rathakrishnan
Indian Institute of Technology Kanpur, India
### [e-10] Flow Control (2)

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<td>Chairpersons</td>
<td>Kazuhisa Fujita (JAXA, Japan)</td>
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<td>Aravindh Kumar S M (Indian Institute of Technology Kanpur, India)</td>
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#### 2015-e-47 ( 11:00 - 11:20 )

**Plasma Magnetic Field Interactions in the Laboratory for Space Science and Technology**

Michael Dropmann\(^1\), Rene Laufer\(^1\), Georg Herdrich\(^1,2\), Lorin S. Matthews\(^1\), Truell W. Hyde\(^1\), Stefanos Fasoulas\(^2\), Hans-Peter Röser\(^2\)

\(^1\)Baylor University, USA, \(^2\)University of Stuttgart, Germany

#### 2015-e-48 ( 11:20 - 11:40 )

**Bow-Shock Instability and its Control in front of Concave Hemispherical Shell at Hypersonic Mach Number 7**

Ashish Vashishtha, Yasumasa Watanabe, Kojiro Suzuki

The University of Tokyo, Japan

#### 2015-e-49 ( 11:40 - 12:00 )

**Flight Stability Analysis for Parafoil-Type Vehicle**

Takahiro Moriyoshi\(^1\), Hiromu Maekawa\(^2\), Kazuhiiko Yamada\(^2\), Takashi Abe\(^3\), Hiroyuki Nishida\(^3\)

\(^1\)Tokyo University of Agriculture and Technology, Japan, \(^2\)Tokai University, Japan, \(^3\)JAXA, Japan

#### 2015-e-50 ( 12:00 - 12:20 )

**An Experimental Study on Aerodynamic Characteristics of the External Nozzle in Clustered Airframe-Integrated Propulsion System Equipped with the RLV**

Tatsushi Isono\(^1\), Sadateke Tomikawa\(^2\), Noboru Sakuranaka\(^3\), Akiko Matsuo\(^3\), Ryo Mikoshiba\(^3\)

\(^1\)Tohoku University, Japan, \(^2\)JAXA, Japan, \(^3\)Aoy University, Japan

### [e-11] Flow Control (3)

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<td>Chairpersons</td>
<td>Kazutaka Kitagawa (Aichi Institute of Technology, Japan)</td>
</tr>
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<td></td>
<td>Taro Handa (Kyushu University, Japan)</td>
</tr>
</tbody>
</table>

#### 2015-e-51 ( 14:00 - 14:20 )

**Flow Control by Repetitive Discharge for Space Vehicle at High Altitude**

Yasumasa Watanabe, Kojiro Suzuki

The University of Tokyo, Japan

#### 2015-e-52 ( 14:20 - 14:40 )

**Aerodynamic Optimization of a Non-Axisymmetric Reusable Launch Vehicle**

Fortunato Nucera\(^1\), Ryoji Takaki\(^2\), Taku Nonomura\(^3\), Kozo Fujii\(^2\)

\(^1\)The University of Tokyo, Japan, \(^2\)JAXA, Japan, \(^3\)SAS-JAXA, Japan

#### 2015-e-53 ( 14:40 - 15:00 )

**Numerical Study of Opposing Jet through Extended Nozzle in Hypersonic Flow**

Jun Yamashita, Naoki Morimoto, Shigeru Aso, Yasuhiro Tani

Kyushu University, Japan
[e-12] Advanced Flow Physics (3)

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<tr>
<td>Chairpersons</td>
<td>Koju Hiraki (Kyushu Institute of Technology, Japan) ; Trevor Moulden (University of Tennessee Space Institute, USA)</td>
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2015-e-56 (16:00 - 16:20)

Aerodynamic Shape Design of Hypersonic Booster with RBCC Engine for TSTO Vehicle
Kojiro Suzuki
The University of Tokyo, Japan

2015-e-57 (16:20 - 16:40)

Free Flight Measurement of Supersonic Biplane using Aeroballistic Range
Daiki Furukawa, Yuma Aoki, Akira Iwakawa, Akihiro Sasoh
Nagoya University, Japan

2015-e-58 (16:40 - 17:00)

Numerical Study of Injected Jets into Supersonic Main Flow on Porous Cavity
Nao Kuniyoshi, Minoru Yaga, Isao Teruya, Masaaki Ishikawa
University of the Ryukyus, Japan

2015-e-59 (17:00 - 17:20)

Surface Pressure/Temperature Measurement of Free-Flight Object by Motion-Capturing PSP/TSP
Masato Ishi1,2, Yuki Yamada2, Hideki Goya2, Takeshi Miyazaki2, Hirotaka Sakaue3
1National Research Institute of Police Science, Japan, 2University of Electro-Communications, Japan, 3JAXA, Japan


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<td>Akihiro Sasoh (Nagoya University, Japan)</td>
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2015-e-60 (9:00 - 9:20)

Mach’s Principle for Turbulent Flow
Trevor H. Moulden
The University of Tennessee Space Institute, USA

2015-e-61 (9:20 - 9:40)

An Experimental Study on the Shock Wave in Air-Filled Small Diameter Tube
Shinsuke Udagawa 1, Tatsuro Image 2, Masanori Ota 3, Kazuo Maeno 4
1TMOCT, Japan; 2Kazuo Maeno’s Laboratory, Japan; 3Chiba University, Japan; 4KMCT, Japan

2015-e-62 (9:40 - 10:00)

High Accuracy Piston Motion Estimation in Free Piston Shock Tunnel
Naoki Morimoto, Jun Yamashita, Akihiko Tabata, Shigeru Aso, Yasuhiro Tani
Kyushu University, Japan

2015-e-63 (10:00 - 10:20)

Dynamic Behaviours of Short Cylinder in Low-Speed Flow
Koju Hiraki, Syohei Yamada, Daikai Zaitsu, Shota Inoue
Kyushu Institute of Technology, Japan
### Session Date
July 7 (Tue) 11:00 – 12:40

### Room
Kobe International Conference Center, International Conference Room 301

### Chairpersons
Rustem Alim Aslan (Istanbul Technical University, Turkey)
Shinichi Kimura (Tokyo University of Science, Japan)

#### 2015-f-06 (11:00 - 11:20)
**What is a Lean Satellite?**
Joseph Casas¹, Daniel Rockberger², Jordi Puig-Suari³

¹NASA Marshall Space Flight Center, USA ²Middle East Technical University, Turkey ³California Polytechnic State University, USA

#### 2015-f-07 (11:20 - 11:40)
**International Standardization on Lean Satellites; Definition and Requirements**
Mengu Cho¹, Filippo Graziani²

¹Kyushu Institute of Technology, Japan ²G.A.U.S.S. Srl, Italy

#### 2015-f-08 (11:40 - 12:00)
**Reliability Growth of Lean Satellites through Testing: HORYU-IV EM Case Study**
Pauline Faure, HORYU-IV Team, Mengu Cho

Kyushu Institute of Technology, Japan

#### 2015-f-09 (12:00 - 12:20)
**Hokkaido Satellite Project: Development of Hyperspectral Cameras for Agricultural Remote Sensing and Spin-Off Business Creation**
Shin Satomi¹, Yusuake Takeuchi², Tonomori Itoh², Sawaoko Satomi²

¹Hokkaido University of Science, Japan ²Hokkaido Satellite Corporation Ltd., Japan

#### 2015-f-10 (12:20 - 12:40)
**Future Use of the TET-Platform and Its Technology for High Performance LEO-Missions**
Stephan Roemer, Silke Eckert

Astro- und Fainwerktechnik Adlershof GmbH, Germany

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### [f-3] Small Satellite Projects (1)

#### Session Date
July 7 (Tue) 15:00 – 16:40

#### Room
Kobe International Conference Center, International Conference Room 301

#### Chairpersons
Alex da Silva Curiel (Surrey Satellite Technology Ltd., UK)

Hiroyasu Tajima (Tokyo University of Science, Japan)

#### 2015-f-11 (15:00 - 15:20)
**The Performance of DS-2 HEPS in Orbit**
Khalid Ibrahim Anoohi

EIAT, UAE

#### 2015-f-12 (15:20 - 15:40)
**Demonstration of Innovative System Design for Twin Micro-Satellite: Hodoyoshi-3 and -4**
Yoshihiro Tsunuda¹, Yoshishide Aoyagi¹, Toshiaki Tanaka¹, Takeshi Matsumoto¹, Shinichi Nakasuka¹, Seiko Shirasaka², Masayasu Matsu³, Ichiro Mase³

¹The University of Tokyo, Japan ²Keio University, Japan ³The Next generation Space system Technology Research Association, Japan

#### 2015-f-13 (15:40 - 16:00)
**R&D and Final Operation of Osaka Institute of Technology 1st PROITERES Nano-Satellite with Electric Rocket Engines and Development of 2nd and 3rd Satellites**
Yuki Kojima, Takuya Kamimura, Yoshifumi Nishimura, Tomoyuki Ikeda, Ryota Fujita, Hirokazu Tahara, OIT PROITERES Team

Osaka Institute of Technology, Japan

#### 2015-f-14 (16:00 - 16:20)
**Development of CubeSat and Activity on Dream Satellite Project**
Ippei Oshima¹, Hideaki Kikuchi², Hirokazu Tahara³, Ryota Hirai², Tomoyuki Ikeda², Ikujirou Ad³, Hirokuki Iijima³, Shin Takeuchi³, Osamu Konno³, Taizou Yamamoto³, Naoki Kabaya³, AstreX Kansai Satellite Group, Dream Satellite Project Team

¹Kobe University, Japan ²AstreX, Japan ³Osaka Institute of Technology, Japan ⁴Osaka Institute of Technology, Ltd., Japan ⁵Nissin inc., Japan ⁶Yamamoto Metal Technos Co., Ltd., Japan ⁷Futureagri Co., Ltd., Japan

#### 2015-f-15 (16:20 - 16:40)
**Development and Flight Results of Microsatellite Bus System for RISING-2**
Yuki Sakamoto¹, Nobuo Sugimura¹, Kazufumi Fukuda¹, Toshinori Kishihara¹, Kazuya Yoshida¹, Junichi Kunihara¹, Tetsuya Fukuhara², Yukihiro Takahashi³

¹Kobe University, Japan ²AstreX, Japan ³Osaka Institute of Technology, Japan ⁴Kobe Engineering Co., Ltd., Japan ⁵Nissin inc., Japan ⁶Yamamoto Metal Technos Co., Ltd., Japan ⁷Futureagri Co., Ltd., Japan
## [f-4] Small Satellite Projects (2)

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<tr>
<td>Chairpersons</td>
<td>Hiroyasu Tajima (Nagoya University, Japan) Alex da Silva Curiel (Surrey Satellite Technology Ltd., UK)</td>
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</table>

**2015-f-16 (17:00 - 17:20)**

**The Integration and Testing of BeEagleSat**

A. Rüstem Aslan1, Mansur Celebi2, Ahmet Sofyah1, Sibel Türgüöz1, M. Sevket Uludağ1, I. Eray Aeyot1, M. Deniz Aksoy1, Erdinc Yalçın1,3, Murat Süer2, Serhan Gökçeşeb1, M. Erdem Bağ1,3

1Istanbul Technical University, Turkey, 2AirForce Academy, Turkey, 3Gumush Space Ltd., Turkey

**2015-f-17 (17:20 - 17:40)**

**First Year Operation of a Micro-Spacecraft Asteroid Flyby Mission: PROCYON**

Yoshihide Sugimoto1, Naoya Ozaki2, Stefano Campagnola1, Chit Hong Yam1, Bruno Sarli1, Hongru Chen1, Yosuke Kawabata2, Satoshi Ogura2, Kaito Akiyoshi2, Chikako Hirose2, Ryu Funase2, Yashiro Kawakatsu2

1JAXA/ISAS, Japan, 2The University of Tokyo, Japan

**2015-f-18 (17:40 - 18:00)**

**Solar Neutron and Gamma-Ray Monitor on the Chubusat-2 Satellite**

Kazutaka Yamaoka, Yasunobu Babazaki, Yuki Hayashi, Hidehiro Kaneda, Hiroaki Kawahara, Kitoku Miyata, Takuya Miyazawa, Hosei Nagano, Yasutaka Narusawa, Sosuke Noda, Hiroyasu Tajima, Keisuke Tamura, Hidetaka Tanaka, Dao Ngoc Hanh Tam

Nagoya University, Japan

**2015-f-19 (18:00 - 18:20)**

**Development of MicroDragon, the First Vietnamese Micro-Satellite**

Nguyen Dinh Chau Minh1, Nguyen Huu Diep1, Bui Nam Duong2, Nguyen Thi Thao3, Shusaku Yamaura1, Seiko Shirasaka1, Shinichi Nakasuka2, Keiichi Okuyama3, Junichi Kurihara4, Development Team1,2,3,4,5

1Kyoto University, Japan, 2The University of Tokyo, Japan, 3Kyushu Institute of Technology, Japan, 4Hokkaido University, Japan, 5Tohoku University, Japan


**A Method of System Design of Ultra-Small Deep Space Probe**

Kei-ichi Okuyama1, Masanori Nishio2, Seiji Fukushima3, Premkumar Saganti3, Doug Holland4

1The Kyushu Institute of Technology, Japan, 2Kagoshima University, Japan, 3Prairie View A&M University, USA, 4NASA, USA

## [f-5] Small Satellite Projects (3)

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<tr>
<td>Chairpersons</td>
<td>Hans-Peter Harmann (AST Advanced Space Technologies GmbH, Germany) Kei-ichi Okuyama (Kyushu Institute of Technology, Japan)</td>
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**2015-f-21 (9:00 - 9:20)**

**The Achievement of the Microbe Observation Micro-Satellite “TeikyoSat-3”**

Katsuya Shibata, Hiroyuki Yoshimura, Takahiro Ando, Takumi Iso, Mafuyu Imai, Yonosuke Yamazaki, Masaaki Kawamura, Hirotoshi Kubota

Teikyo University, Japan

**2015-f-22 (9:20 - 9:40)**

**Mission Design of Deep Space Sculpture – ARSTAT2: DESPATCH**

Motoki Kimura1, Nao Usami1, Kyohei Sawada1, Kento Nakazawa1, Junshi Horuguchi2, Ron Hashimoto2, Akhiro Kubota2

1The University of Tokyo, Japan, 2Tama Art University, Japan

**2015-f-23 (9:40 - 10:00)**

**Utilization of HODOYOSHI-3&4 Hosted Payloads in the Field of Advertisement and Entertainment**

Toshiki Tanaka1, Reiko Satogata2, Yuzo Shibayama2, Koji Yamaguchi2, Ryuhei Hamaguchi1, Kent Nakazawa1, Shinichi Nakasuka1

1The University of Tokyo, Japan, 2NESTRA, Japan
**Nuclear Spectroscopic Approach to Study M-type Near-Earth-Asteroids on the Miniature Deep Space Satellite**

N. Hasebe¹,², H. Kusano¹, H. Nagaoka¹, S. Shimizu¹, M. Miyajima¹, E. Shibamura¹, H. Kuno¹, M. Naito², K. Yoshida², T. Adachi², José A. Matias-Lopes²

¹Waseda University, Japan, ²University of Coimbra, Portugal

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**Measurement of Ionosphere Plasma by Electron Density and Temperature Probe**

Takahiro Miyazaki¹, Josaphat Tetuko Sri Sumantyo¹, Nobuyoshi Imura¹, Takumi Abe¹, Tomoyuki Nakazono², Koichiro Oyama³, Tetsuya Kodama²

¹Chiba University, Japan, ²JAXA, Japan, ³AES, Japan, ⁴Kyushu University, Japan

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**Session Date**
July 8 (Wed) 11:00 – 13:00

**Room**
Kobe International Conference Center, International Conference Room 301

**Chairpersons**
Kei-ichi Okuyama (Kyushu Institute of Technology, Japan)
Hans-Peter Harmann (AST Advanced Space Technologies GmbH, Germany)

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**Development of Binary Black Hole Observation Satellite "ORBIS"**

Naoki Otsuka, Hironori Sahara, ORBIS Team
Tokyo Metropolitan University, Japan

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**Current Attainability of a Lunar Microsatellite Mission for Universities and Similar Institutions**

Mark Stibbard, Sean Tuttle
The University of New South Wales, UK

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**Feasibility Study of using Doppler RADAR on Microsatellite for Debris Identification and Cataloguing**

Manjunath Ganesh¹, Levanan Vengadasalam², Keyur Mahant³

¹Sathyabama University, India, ²Arthur C Clarke Institute for Modern Technologies, Sri Lanka, ³CHARUSAT Space Technology Center, India

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**Design of a Nanosatellite for Remote Sensing Images of the Earth's Surface**

Ricardo Arturo Vazquez Robledo¹, Miguel Angel Alvarado Zaragoza¹, Iñaki Erazo Damian¹, Rigoberto Reyes Morales¹, Alberto Cordero Davila², Benito Orozco Serna³, Saul De La Rosa Nieves¹

¹National Autonomous University of Mexico, Mexico, ²Autonomous University of Puebla, Mexico, ³Mexican Space Agency, Mexico

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**On-Orbit Small Satellite Station for CubeSats**

Manjunath Ganesh
Sathyabama University, India

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**Conceptual Design of Multipurpose Space Environment Utilization Satellite "Teikyosat-4"**

Yonosuke Yamazaki, Mafuyu Imai, Takumi Iso, Luka Matsuya, Masaaki Kawamura
Tokyo University, Japan

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**Session Date**
July 8 (Wed) 15:00 – 16:20

**Room**
Kobe International Conference Center, International Conference Room 301

**Chairpersons**
Yuji Sakamoto (Tohoku University, Japan)
Hironori Sahara (Tokyo Metropolitan University, Japan)

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**Providing SmallSat Access to More Launch Vehicles**

Kaitlyn Kelley, Phil Brzytwa
Spaceflight Inc., USA
Cluster Launch of Hodoyoshi-3 and -4 Satellites from Yasny by Dnepr Launch Vehicle

Seiji Yoshimoto1, Shinichi Nakasuka1, Yoshiro Tsuruda1, Yoshihide Aoyanagi1, Toshihi Tanaka1, Hironori Sahara2, Takehiro Ohira3, Yuta Araki3, Ichiro Mase4, Miki Ito5, Vladimir Kainov6, Andrey Karandaev5, Olexij Silkin6

1The University of Tokyo, Japan, 2Tokyo Metropolitan University, Japan, 3Nihon University, Japan, 4The Next Generation Space System Technology Research Association, Japan, 5ISC Kosmotras, Russia, 6Yuzhnoye State Design Office, Ukraine

Cold Gas Thruster Qualification for FORMOSAT 5

Hans-Peter Harmann1, Tammo Rombach2, Heiko Dartsch1

1AST Advanced Space Technologies GmbH, Germany, 2SpaceTech GmbH Immenstaad, Germany

Lifetime Test of a Cold Gas Thruster

Hans-Peter Harmann, Heiko Dartsch

AST Advanced Space Technologies GmbH, Germany

Attitude Estimation for Nanosatellites using Singular Value Decomposition and Unscented Kalman Filter

Halil Ersin Soken1, Demet Cilden2, Chingiz Hajiyev2

1JAXA, Japan, 2Istanbul Technical University, Turkey

Development of a COTS Sounding Rocket and Variable Dynamic Vibration Absorber Cansat Payload

EuGene Kim1, Yuichiro Tanaka2, Ken Biba3, Becky Green3

1The University of Sydney, Australia, 2Tokyo Institute of Technology, Japan, 3Aeropac, US

Development and On-Orbit Demonstration of the Propulsion System Based on 60wt% Hydrogen Peroxide for Microsatellites

Takeshi Sakuma1, Hironori Sahara1, Naoki Miyasita2, Yusuke Kurokamo2, Masayasu Matsui3, Seiji Yoshimoto4, Yoshihiro Tsuruda4, Shinichi Nakasuka5

1Tokyo Metropolitan University, Japan, 2Axelspace Corporation, Japan, 3NEXTRA, Japan, 4NANO-SATELLITE CENTER, Japan, 5The University of Tokyo, Japan

Attitude Simulation and Result of On-Orbit Initial Operation of Microsatellite "TSUBAME"

Shota Kawajiri1, Masanori Matsushita1, Kyosuke Tawara1, Masaya Koga1, Saburo Matunaga2

1Tokyo Institute of Technology, Japan, 2SASUJAXA, Japan

Attitude Determination and Control of Nano-Satellite "SPROUT"

Kento Ohnata, Mahisako Yamazaki, Yasuyuki Miyazaki

Nihon University, Japan

Attitude Control Performance Evaluation of Flexible Microsatellite using Control Moment Gyros during Large-Angle Attitude Maneuver

Ting Hao1, Saburo Matunaga2

1Tokyo Institute of Technology, Japan, 2SASUJAXA, Japan
2015-f-44 (10:00 - 10:20)

Attitude Determination and Control System for Micro Spacecraft PROCYON
Satoshi Ikari1, Toshihiro Nakatani1, Takaya Inamori1, Takahiro Ito2, Shinichiro Sakai2, Yasuhiro Kawakatsu2, Ryu Funase3
1The University of Tokyo, Japan, 2JAXA, Japan

[f-10] Small Satellite Launch, Orbit and Attitude Control (4)

Session Date       July 9 (Thurs) 11:00 – 12:40
Room               Kobe International Conference Center, International Conference Room 301
Chairpersons       Toshinori Kuwahara (Tohoku University, Japan)
                    Mengu Cho (Kyushu Institute of Technology, Japan)

2015-f-45 (11:00 - 11:20)

Effects of On-Orbit Eddy Current in Naturally Detumbling and Spin-Rate Damping of Cubesats in Low Earth Orbit
ENS Christopher Dinelli, Hampson Skinker, Alexander Dinelli, Alexander Cherry, James Thurman, Haley Doyle, Robert Bruninga, Carl Mungan, Jin S. Kang
United States Naval Academy, USA

2015-f-46 (11:20 - 11:40)

Accuracy Improvement on Attitude Maneuver Simulations for Microsatellites Using CMGs
Kyosuke Tawara1, Shota Kawaji1, EuGene Kim1, Saburo Matunaga2
1Tokyo Institute of Technology, Japan, 2JAXA, Japan

2015-f-47 (11:40 - 12:00)

Flight Verification of Attitude Determination Methods for Microsatellite RISING-2 using Magnetometers, Sun Sensors, Gyro Sensors, and Observation Images
Yuji Sakamoto, Nobuo Sugimura, Kazufumi Fukuda, Toshinori Kuwahara, Kazuya Yoshida
Tohoku University, Japan

2015-f-48 (12:00 - 12:20)

Attitude Control of UWE-4 for Orbit Correction During Formation Flying
Siddharth Dadhich, Philip Bangert, Klaus Schilling
Würzburg University, Germany

2015-f-49 (12:20 - 12:40)

An Evaluation of Fitted Drag Coefficients of 3U CubeSats
Alejandro Macario Rojas
The University of Manchester, UK

[f-11] Small Satellite Launch, Orbit and Attitude Control (5)

Session Date       July 9 (Thurs) 14:00 – 15:40
Room               Kobe International Conference Center, International Conference Room 301
Chairpersons       Yoshihiro Tsuruda (The University of Tokyo, Japan)
                    Hirokazu Masui (Kyushu Institute of Technology, Japan)

2015-f-50 (14:00 - 14:20)

Nonlinear Attitude Control of a Small University Earth Observation Satellite
Rigoberto Reyes Morales, Carlos Romo Fuentes
The National Autonomous University of Mexico, Mexico

2015-f-51 (14:20 - 14:40)

Static Closed Loop Simulation of Attitude Control System of Microsatellite "RISESAT"
Kazufumi Fukuda, Toshinori Kuwahara, Yuji Sakamoto, Kazuya Yoshida
Tohoku University, Japan

2015-f-52 (14:40 - 15:00)

Design and Implementation of a Thermopile-Based Earth Sensor
Toshinori Kuwahara1, Kazufumi Fukuda1, Nobuo Sugimura1, Yuji Sakamoto1, Kazuya Yoshida1, Arianna Dorsa2, Pietro Pagani2, Franco Z. Bernelli2
**[f-12] Small Satellite Power System**

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</table>
| Chairpersons | Hirokazu Masui (Kyushu Institute of Technology, Japan)  
|              | Yoshihiro Tsuruda (The University of Tokyo, Japan) |

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**2015-f-55 (16:00 - 16:20)**

**Degradation Acceleration Tests of COTS Lithium-Ion Secondary Battery for Lean Satellites**

Takuya Motohata, Tatsuo Shimizu, Hirokazu Masui, Mengu Cho  
Kyushu Institute of Technology, Japan

---

**2015-f-56 (16:20 - 16:40)**

**Design and Testing of Electrical Power Subsystem (EPS) of a Lean Satellite, HORYU-IV**

Mohamed Yahia Edries, Atomu Tanaka, Erdenebaatar Dashdondog, Hala O. Almubarak, Muhammad Alkali, Mengu Cho  
Kyushu Institute of Technology (KIT), Japan

---

**2015-f-57 (16:40 - 17:00)**

**In-Orbit Performance of VELOX-PII Power Management System**

Jia Min Lew, Htet Aung, Jing Jun Soon, Kay-Soon Low  
Nanyang Technological University, Singapore

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**2015-f-58 (17:00 - 17:20)**

**Environment Test Campaign of Triple Junction Photovoltaic on Aluminium Substrate Solar Panel for Lean-Satellite**

Halla O. Almubarak1, Hirokazu Masui1, Mengu Cho1, Mohd Izzed Mustaffa2, Norhizam Hamzah2  
1Kyushu Institute of Technology, Japan, 2Astronautic Technology (M) Sdn Bhd, Malaysia

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**2015-f-59 (17:20 - 17:40)**

**Innovative Power Generation and Management Methods for a RADAR Space-Based Earth Observation System**

Ali Ramezan Nojad  
Royal Melbourne Institute of Technology (RMIT University), Australia

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**[f-13] Small Satellite Thermal and Structure System**

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| Chairpersons | Yasuyuki Miyazaki (Nihon University, Japan)  
|              | Hiraku Sakamoto (Tokyo Institute of Technology, Japan) |

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**2015-f-60 (9:00 - 9:20)**

**Thermal Design and Evaluation of Microsatellite TSUBAME Using Thermal Analysis During Orbit**

Sota Suzuki1, Takashi Nagasun2, EuGene Kim1, Saburo Matunaga2  
1Tokyo Institute of Technology, Japan, 2ISAS/JAXA, Japan

---

**2015-f-61 (9:20 - 9:40)**

**Development of Re-Entry Nano-Satellite with Gossamer Aeroshell and GPS/Iridium Deployed from ISS**

Kazuhiko Yamada1, Kojio Suzuki2, Osamu Imamura3, Daikoku Akita4, Yasunori Nagata5, Yasuhiro Shoji6, Yusuke Takahashi7, Yusumasa Watanabe2, Takashi Abe1, MAAC group
## Small Satellite On-orbit Control and Equipment

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| Chairpersons       | Hiraku Sakamoto (Tokyo Institute of Technology, Japan)  
|                    | Yasuyuki Miyazaki (Nihon University, Japan) |

### 2015-f-66 (11:20 - 11:40)

**Title:** State Transition Simulation of Distributed Autonomous Microsatellite  
**Authors:** Shuhei Hotta, Hironori Sahara  
**Affiliations:** Tokyo Metropolitan University, Japan

### 2015-f-67 (11:40 - 12:00)

**Title:** Research of Radiation Testing Method for Lean-Satellites using Californium-252  
**Authors:** Takahiro Tomicka¹, Koyo Taniwaki¹, Hirokazu Masui¹, Mengu Cho¹, Koichi Takamiya²  
**Affiliations:** ¹Kyushu Institute of Technology, Japan, ²Kyoto University Research Reactor Institute, Japan

### 2015-f-68 (12:00 - 12:20)

**Title:** Low-cost Simulation and Verification Environment for Micro-Satellites  
**Authors:** Toshinori Kuwahara, Kazumori Fukuda, Nobuo Sugimura, Yuji Sakamoto, Kazuya Yoshida  
**Affiliations:** Tohoku University, Japan

### 2015-f-69 (12:20 - 12:40)

**Title:** Anomaly Investigation using Telemetry Data of Horyu-2’s for Single Event Latch-Up  
**Authors:** Hirokazu Masui, Yuzo Tanaka, Takahiro Tomicka, KIT satellite project, Mengu Cho  
**Affiliations:** Kyushu Institute of Technology, Japan

## Small Satellite Sensors and Equipment

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| Chairpersons       | Tsuyoshi Totani (Hokkaido University, Japan)  
|                    | Shinichi Kimura (Tokyo University of Science, Japan) |

### 2015-f-70 (14:00 - 14:20)

**Title:** Evaluation of Artificial Meteor Sources with Arc Heater Wind Tunnel  
**Authors:** Masaki Watanabe¹, Koki Sakuyama¹, Hirotoni Sahara³, Soichiro Numata², Shinzuke Abe², Takeo Watanabe³, Takayuki Shimoda⁴, Junsei Nagao⁵, Yuta Noji⁶, Lena Okajima⁷  
**Affiliations:** ¹Tokyo Metropolitan University, Japan, ²Nihon University, Japan, ³Teikyo University, Japan, ⁴ISAS/JAXA, Japan, ⁵AMES CO., LTD., Japan, ⁶Avitaspace Corp., Japan, ⁷ALE CO., LTD., Japan

### 2015-f-71 (14:20 - 14:40)

**Title:** Difficulty to Apply DC Probe Measurements to a Small Satellite Small Satellite Mission and Its Solutions  
**Authors:** K.-I. Oyama¹,², H. K. Fang²  
**Affiliations:** ¹Tokyo University, Japan, ²Tokyo Institute of Technology, Japan
Camera for Space Debris Removal for Small Satellite
Kotomi Shoji1, Yasuhiro Katayama2, Atsushi Ueta2, Daisuke Tsujita2, Tomohiro Narumi1, Shinichim Kimura1
1The Tokyo University of Science, Japan, 2JAXA, Japan

APAGPR: A Space-based Ground Penetrating RADAR System using a CubeSat Platform
Prateek Badiger
RMIT University, Australia

CubeSat Design for Space Demonstration of Deployable Membrane Structure Technologies
Hiraku Sakamoto1, Hiroki Nakanishi1, Masahiko Yamazaki2, Yassuyuki Miyazaki2, Hiroshi Funuya1, Akihito Watanabe3, Kazuki Watanabe4, Mitsushige Oda1
1Tokyo Institute of Technology, Japan, 2Nihon University, Japan, 3Sakase Adtech, Japan, 4WEL Research, Japan

Low-Cost and Ultimately-Downsized Onboard Deep Space Telecommunication System for PROCYON Mission
Yuta Kobayashi1, Atsushi Tomiki1, Shigeo Kawasaki1, Taku Nonomura1, Makoto Mita1, Taichi Ito1, Daisuke Kobayashi1, Yosuke Fukushima1, Ryu Funase2, Yasuhiro Kawakatsu3
1JAXA, Japan, 2The University of Tokyo, Japan

Telemetry and Telecommand of VELOX-P II with Ground Communication in Near Urban Environment
S. T. Goh, K. S. Low, C. Ye, K. Ian
Nanyang Technological University, Singapore

Development and Flight Results of a Cubesat with Ku-Band Transmitters
Hiroki Morita, Masanori Nishio, Masaru Nakano, Sayuri Wago
Kagoshima University, Japan

Data Analysis for Tracking QB50P1 and QB50P2 Based on NCKU Ground Station
Chiung-Hui Tsai
National Cheng Kung University, Taiwan

Ready for the Flight Demonstration of H-IIA Upgrade Programm
Chikara Ishikawa, Daisuke Yabusaki, Koji Sunami, Takeshi Fujita
Japan Aerospace Exploration Agency, Japan

Extending Rideshare: Mission Case Studies using Propulsive ESPA
Christopher Pearson1, Marissa Stender1, Joe Maly2, Christopher Loghry3
### [g-2] Epsilon Launch Vehicle (1)

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<td>Chairpersons</td>
<td>Etienne Dumont (DLR German Aerospace Center, Germany)</td>
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<td>Chester Crone (Moog, USA)</td>
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### 2015-g-06 (11:00 - 11:20)

**Novel Design Concept of the Epsilon Launch Vehicle**

Yasuhiro Morita¹, Takayuki Imoto¹, Ryoma Yamashiro¹, Kohichi Kishi², Hirohito Ohtsuka²

¹JAXA, Japan, ²IHI Aerospace, Japan

### 2015-g-07 (11:20 - 11:40)

**Enhanced Epsilon**

Takayuki Imoto, Yasuhiro Morita, Ryoma Yamashiro, Koji Nakaya

JAXA, Japan

### 2015-g-09 (11:40 - 12:00)

**Aerodynamics of Epsilon Rocket for First Flight and Next Enhanced System**

Satoshi Nonaka², Seiji Tsutsumi¹, Keiichi Kitamura²

¹JAXA, Japan, ²Yokohama National University, Japan

### 2015-g-10 (12:00 - 12:20)

**Developing Status of Guidance and Control System for Enhanced Epsilon Launch Vehicle**

Hiroyuki Yamaguchi¹, Yasuhiro Morita¹, Takayuki Imoto¹, Takayuki Yamamoto¹, Takanao Sakai¹, Hirohito Ohtsuka², Kensaku Tanaka²

¹JAXA, Japan, ²IHI Aerospace, Japan

### 2015-g-12 (12:20 - 12:40)

**Development Status of Solid Propulsion System for Enhanced Epsilon Launch Vehicle**

Koki Kitagawa¹, Shinichiro Tokudome¹, Keiichi Hon¹, Hiroto Habu¹, Eiichi Wada¹, Haruho Tanno², Nobuyuki Nakano²

¹JAXA, Japan, ²IHI Aerospace, Japan

### [g-3] Epsilon Launch Vehicle (2)

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<td>Chairpersons</td>
<td>Hideaki Ogawa (RMIT University, Australia)</td>
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<td>Chikara Ishikawa (JAXA, Japan)</td>
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### 2015-g-11 (15:00 - 15:20)

**The System Design of Enhanced Epsilon Launch Vehicle**
The Development Status of the Structure Subsystem for Enhanced Epsilon Launch Vehicle

Ryoma Yamashiro, Kenji Minesugi, Toru Kamita, Ken Goto, Kyoichi Ui, Seiji Tsutsumi, Tsuyoshi Hoshino, Mitsuya Sakamoto, Naruhisa Sano, Koichi Kishi

JAXA, Japan

Development Status of Payload Fairing for Enhanced Epsilon Launch Vehicle

Koh Nakagawa, Ryoma Yamashiro, Kyoichi Ui, Toru Kamita, Hiroshi Ikaida, Seiji Nishida, Nanuhiko Chiku, Yoshihiko Komada

JAXA, Japan, Kawasaki Heavy Industries, Ltd.

Adaptation of Navigation-grade MEMS Gyros for Future Launch System

Takeshi Sasada, Hiroshi Nishida

JAXA, Japan, Sumitomo Precision Products Co., Ltd., Japan

Approaches to Improve the Launch Vehicle Dynamic Environment for Future Launch System

Keita Terashima, Toru Kamita, Kyoichi Ui, Tsuyoshi Hoshino

JAXA, Japan, PH Aerospace, Japan

Payload Interface Information and Interface Coordinating Activities of Enhanced Epsilon Launch Vehicle

Koji Nakaya, Ryoma Yamashiro, Kyoichi Ui, Tetsuya Ono, Takayuki Imoto, Yasuhiro Morita

JAXA, Japan

Launch Operations, Ground Support Equipments and Facilities of Epsilon Rocket

Takeshi Yui, Kenichi Hirose

JAXA, Japan

Plan of Launch Operation and Launcher Improvement of Enhanced Epsilon

Tetsuya Ono, Shigeru Shimose, Kenji Minesugi

JAXA, Japan

RBCC-Based Suborbital TSTO Systems: Part 1 - Optimisation and Uncertainty Analysis

Hideaki Ogawa, Pavel Trivailo, Tuan Ho, Roberto Sabatini, Alessandro Gardi, Subramanian Ramasamy

RMIT University, Australia

RBCC-Based Suborbital TSTO Systems: Part 2 - Guidance, Navigation and Control Strategies

Hideaki Ogawa, Roberto Sabatini, Subramanian Ramasamy, Alessandro Gardi

RMIT University, Australia

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Kouichiro Tani (JAXA, Japan)

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Benefits of Human Modeling for Next Generation Manned Rocket Design

Thomas J. Hagale
The Boeing Company, USA

2015-g-24 ( 10:00 - 10:20 )

Aerodynamic Characteristics Study on Waverider for Applying to TSTO

Tomoyuki Muta1, Haruka Etoh1, Nobuyuki Tsuboi1, Yusuke Maru2, Kazuhiro Fujita2
1Kyushu Institute of Technology, Japan, 2JAXA, Japan

2015-g-25 ( 10:20 - 10:40 )

Numerical Study of Waverider-Airfoil-Based SpacePlanes for Two-Stage-To-Orbit Missions

Naoto Morita
Waseda University, Japan

[g-6] Technology for Future Space Transportation System

Session Date
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Chairpersons
Thomas J. Hagale (The Boeing Company, USA)
Takeshi Sasada (JAXA, Japan)

2015-g-26 ( 11:00 - 11:20 )

Stability Analysis of Non-Linear Dynamic Inversion Controller Applied to Winged Rocket

Hiroshi Yamasaki, Koichi Yonemoto, Takaaki Matsumoto, Kyushiro Itakura, Guna Surendra Gossamsetti, Masatomo Ichige, Yusuke Ura
Kyushu Institute of Technology, Japan

2015-g-28 ( 11:20 - 11:40 )

Control System for Sea-Based Take-Off/Landing Suborbital Space Plane

Masahiro Nakamura1, Tomohiro Narumi1, Shinichii Kimura1, Hiroshi Yamamoto2, Yoshiaki Ohkami3
1Tokyo University of Science, Japan, 2Okinawa Space Port, Inc., Japan, 3Koio University, Japan

2015-g-29 ( 11:40 - 12:00 )

Development and Evaluation of Guidance Methodology using Dynamically Distributed Genetic Algorithm for Sub-Orbital Winged Rocket

Masatomo Ichige, Koichi Yonemoto, Takaaki Matsumoto, Hiroshi Yamasaki, Kyushiro Itakura
Kyushu Institute of Technology, Japan

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Aerodynamic Trim Characteristics of Winged Rocket Tested by Subsonic and Supersonic Wind Tunnel

Yusuke Ura, Yuki Kutsuna, Koichi Yonemoto, Takaaki Matsumoto
Kyushu Institute of Technology, Japan

[g-7] Experiment and Demonstration for Space Transportation System

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Chairpersons
Kyoichi Ui (JAXA, Japan)
Atsushi Murakami (IHI Aerospace, Japan)

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Aerodynamics and Flight Capability of a Supersonic Flight Experiment Vehicle

Kazuhide Mizobata1, Yoshihiro Suzuki1, Sakae Ooishi1, Satoshi Kondoh1, Tsukasa Toguchi1, Yukiya Ishigami1, Masayuki Miura1, Takakage Araki2, Kazuyuki Higashino3
1Muroran Institute of Technology, Japan, 2Osaka Prefecture University, Japan

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Progress of Technical Demonstrations for Reusable Sounding Rocket System

Takashi Ito, Satoshi Nonaka, Hiroyuki Ogawa
**Firing Tests for the Main Engine of the Reusable Sounding Rocket**
Toshiya Kimura1, Tomoyuki Hashimoto1, Masaki Sato1, Satoshi Takada1, Tsuyoshi Yagishita1, Yoshihiro Naruo1, Hiroyuki Ogawa1, Takashi Ito1, Kimihito Obase2, Yuya Fukuda2, Takeshi Kai2
1JAXA, Japan, 2Nagoya Guidance & Propulsion Systems Works, MHI, Japan

**Conceptual Design and Testing of Propulsion Systems for Reusable Sounding Rocket**
Noriaki Masuda1, Keitaro Ishikawa2, Iwao Igarashi3, Hiroshi Kawato1, Satoshi Nonaka1, Takashi Ito2, Takehiro Himeno3
1Mitsubishi Heavy Industries, Japan, 2JAXA, Japan, 3University of Tokyo, Japan

**Numerical Simulation of the External Flow Effect on Linear Aerospike Nozzle Performance**
Masafumi Shibao1, Nobuyuki Tsuboi1, Takashi Ito2
1Kyushu Institute of Technology, Japan, 2JAXA, Japan

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**[h-1] Plasma, Colloid, and Emulsion**

**Comparisons of Particle Energy Estimated from Different Methods in Complex Plasmas**
Satoshi Adachi1,2, Hiroo Totsuji3, Kazuo Takahashi4
1JAXA, Japan, 2SOKENDAI, Japan, 3Okayama University, Japan, 4Kyoto Institute of Technology, Japan

**Effect of Gravity on the Stability of W/O Emulsion**
Yuji Yamashita1, Takahiro Yamazaki1, Takeshi Endo2, Kenichi Saka2, Hideki Saka2, Makoto Natsuisaka3, Kazutami Sakamoto1,2
1Chiba Institute of Science, Japan, 2Tokyo University of Science, Japan, 3JAXA, Japan

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**[h-2] Crystal Growth, Fluid, and Thermophysical Properties**

**Thermophysical Property Measurements of Oxide Melts at High Temperature by Electrostatic Levitation Furnace on the ISS**
Tkaehiko Ishikawa1, Junpei T. Okada1, Yuki Watanabe2, Haruka Tamaru1, Yasuhiro Nakamura1
1JAXA, Japan, 2A. E. S. Co., Ltd., Japan

**Introduction of Microgravity Experiment on Marangoni Convection in Liquid Bridge On-Board ISS**
Satoshi Matsumoto
Japan Aerospace Exploration Agency, Japan

**Morphological Change of S/L Interface in Semiconductor Solution Growth under Reduced Convection Condition**
Yuko Imatomi1, Mukannan Arivanandhan2, Velu Nirmal Kumar2, Haryo Mirsani3, Tadanobu Koyama2, Yoshimi Momose2, Tetsuo Ozzawa1, Takehiko Ishikawa1, Yasunori Okano3, Yasuhiro Hayakawa2, et al.
1Japan Aerospace Exploration Agency, Japan, 2Shizuoka University, Japan, 3Osaka University, Japan, 4Shizuoka Institute of Science and Technology, Japan

**A Numerical Simulation Study on the Growth Process of InGaSb Crystals under Microgravity by Using Open FOAM**

### [h-3] Future Plans and Facilities

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**The Two Microgravity Sounding Rockets Missions at Esrange; Cryofenix and MASER 13**

Christian Lockowandt, Mattias Abrahamsson, Gunnar Florin
Swedish Space Corporation, Sweden

#### 2015-h-14 (15:20 - 15:40)

**Low Gravity Environment Obtained by a Freefall Capsule with a High Altitude Balloon**

Takehiko Ishikawa¹, Masao Kikuchi¹, Shin Yamamoto, Shujiro Sawai¹, Yusuke Maru¹, Shinichiro Sakai¹, Nobutaka Bando¹, Shigehito Shimizu¹, Hiroaki Kobayashi¹, Tetsuo Yoshimitsu¹, et al.
¹JAXA, Japan, ²IHI Inspection & Instrumentation Co. Ltd., Japan

#### 2015-h-15 (15:40 - 16:00)

**Development of Composite Vehicle for the Experiment of Microgravity**

Huiwen Hu¹, Yen-Sen Chen², Ting-Wei Chen¹, Chih-Wei Yang¹
¹National Pingtung University of Science & Technology, Taiwan, ²National Space Organization, Taiwan

#### 2015-h-16 (16:00 - 16:20)

**Design of a 1.5 Seconds High Quality Micro Gravity Drop Tower Facility**

Jakob Breuninger¹,², Valentin Belsier¹,², René Lauffer², Michael Dropmann¹,², Georg Hendrich¹,², Truell Hyde², Hans-Peter Röser¹
¹University of Stuttgart, Germany, ²Baylor University, USA

### [h-4] Combustion

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<td>Takehiko Ishikawa (JAXA, Japan)</td>
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#### 2015-h-17 (17:00 - 17:20)

**Study of Partial Prevaporation Effects on Flame Spread of a Linear N-Decane Droplet Array in Microgravity**

Masao Kikuchi¹, Yuki Kan¹, Seijiro Fukuyama²
¹JAXA, Japan, ²AESC Co., Ltd., Japan

#### 2015-h-18 (17:20 - 17:40)

**Droplet Array Combustion Experiments on Effect of Initial Droplet Diameter on Flame Spread Characteristic Time**

Yusuke Suganuma¹, Noriyuki Ikeyama², Hiroshi Nomura¹, Yasushige Ujiie¹
¹Nihon University, Japan, ²Graduate School of Industrial Technology, Nihon University, Japan

#### 2015-h-19 (17:40 - 18:00)

**Effects of Droplet Interaction on Heat-Release Locations around a Fuel Droplet Pair in Hot Air in Microgravity**

Osamu Morius¹, Takenu Iwamoto¹, Masanori Sugihara¹, Kota Yone¹, Hideki Hashimoto¹, Eiichi Murase¹, Hiroshi Nomura²
¹Kyushu University, Japan, ²Nihon University, Japan

#### 2015-h-20 (18:00 - 18:20)

**Numerical Study on Flames near Extinction Limit in Opposed Flow Configuration over Thin Solid Fuels in Micro-Gravity**

Kiran Kumar M N, Amit Kumar
Indian Institute of Technology Madras, India

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# Effect of Ambient Gas on Flammability Limit of Flat Materials in Microgravity

Kandai Tsuboi¹, Shuehi Takahashi¹, Tadayoshi Ihara¹, Subrata Bhattacharjee²

¹Gifu University, Japan, ²San Diego State University, USA

## [i-1] Thermal Control Hardware (1)

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### 2015-i-01 (11:00 - 11:20)

**Development of Helium-3 Compressors and Integration Test of Closed-Cycle Dilution Refrigerator System**

Keisuke Shinozaki¹, Kenichiro Sawada¹, Yoichi Sato¹, Hiroyuki Sugita¹, Kazuhsa Mitsuda², Philippe Camus³, Gérard Vermeulent³, Sébastien Triqueneaux³, Sylvain Martin⁴, Stéphane d’Espaignet⁵

¹JAXA/ARD, Japan, ²JAXA/ISAS, Japan, ³CNRS, France, ⁴Air Liquide, France, ⁵CNES, France

### 2015-i-02 (11:20 - 11:40)

**Heat Storage and Release Tests of Heat Storage Material with Crystal Transformation**

Tsuyoshi Totani, Takuya Kunih, Tohifumi Satoeh, Masashi Wakita, Harunori Nagata

Hokkaido University, Japan

### 2015-i-03 (11:40 - 12:00)

**Emissivity Estimation of a Black Paint Surface at Cryogenic Temperatures**

Makiko Ando, Kosuke Tanaka, Keisuke Shinozaki, Yoichi Sato, Kenichiro Sawada, Hiroyuki Sugita

JAXA, Japan

### 2015-i-04 (12:00 - 12:20)

**Parametric Study of Oscillating Heat Pipes by using Mathematical Model for Practical Use in Spacecraft**

Takurou Daimaru¹, Shuhei Yoshida¹, Hiroki Nagai¹, Atsushi Okamoto², Makiko Ando², Hiroyuki Sugita²

¹Tohoku University, Japan, ²JAXA, Japan

### 2015-i-05 (12:20 - 12:40)

**Thermal Performance of a Small Loop Heat Pipe with Multiple Evaporators and Multiple Condensers under Vacuum Condition**

Hosei Nagano, Xinyu Chang

Nagoya University, Japan

## [i-2] Thermal Control Hardware (2)

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### 2015-i-07 (14:00 - 14:20)

**Experimental Study in Effects of Secondary Wick Configuration on Thermal Performance of a Loop Heat Pipe**

Masahiro Taketani, Takuya Adachi, Hiroki Nagai

Tohoku University, Japan

### 2015-i-08 (14:20 - 14:40)

**Conceptual Design Study of Oscillating Heat Pipe System for GAPS**

Shun Otsuka¹, Hideyuki Fuke¹, Takayoshi Inoue², Akiko Kawachi³, Daishi Matsumoto⁴, Yoshiro Miyazaki⁵, Hiroki Nagai⁶, Taku Nomumura⁶, Hiroyuki Ogawa¹, Noboru Yamada⁷

¹JAXA, Japan, ²Tokyo Institute of Technology, Japan, ³Tokai University, Japan, ⁴Chiyoda Air-con Parts Co., Ltd., Japan, ⁵Pukui University of Technology, Japan, ⁶Tohoku University, Japan, ⁷Nagoya University of Technology, Japan

### 2015-i-09 (14:40 - 15:00)

**Development of 100W-Class Loop Heat Pipes for Space Use and On-Orbit Experiment Test Plan**

Atsushi Okamoto, Ryuta Hatakena, Takeshi Miyakita, Hiroyuki Sugita

Japan Aerospace Exploration Agency (JAXA), Japan
[i-3] Spacecraft Thermal Control

### Development of an Oscillating Heat Pipe Cooling System for GAPS

Hideyuki Fuke1, Takayoshi Inoue2, Akiko Kawachi3, Daishi Matsumoto4, Yoshihiro Miyazaki5, Hiroki Nagai6, Taku Nonomura1, Hiroki Ogawa3, Shun Okazaki1, Noboru Yamada7, et al.

1JAXA, Japan, 2Tokyo Institute of Technology, Japan, 3Tokai University, Japan, 4Chiyoda Air-con Parts Co., Ltd., Japan, 5Fuku University of Technology, Japan, 6Tokoku University, Japan, 7Nagawa University of Technology, Japan

### Thermal Control Verification and Analysis of Electron Emission Device for KITE Project

Moto Takai, Yasushi Otake, Tepepe Okumura, Kazutaka Kawashima, Yuta Horikawa, Ryuta Hatakena, Koichi Inoue

JAXA, Japan

### A Proposal and Verification of the Overnight Method on Lunar Surface by Interacting with Regolith Constant Temperature Layer

Shogo Okishio1, Ryota Notsu1, Hosei Nagano1, Hiroyuki Ogawa2

1Nagoya University, Japan, 2JAXA, Japan

### Shinen2, an Ultra-Small Deep Space Probe: Thermal Design and Analysis

Bianca Szasz, Kei-ichi Okuyama

Kyushu Institute of Technology, Japan

### Thermal Analysis and Testing of Arc Event Generator and Investigation Satellite (AEGIS), HORYU-IV

Trinh Thang LONG, Takashi Yamasaki, Hirokazu Masui, Mengo Cho

Kyushu Institute of Technology, Japan

[j-1] Satellite Navigation and Geodesy

### Accuracy Evaluation of PPP-AR with Satellite FCBs

Masaya Nakano1, Seiji Katagiri1, Nobuhiro Kajiwara1, Satoshi Kogure2, Motoyuki Miyoshi3, Kaori Kawate2, Tomoji Takasu3

1Fujitsu Ltd., Japan, 2JAXA, Japan, 3Lighthouse Technology and Consulting Co., Ltd., Japan

### Hybrid GNSS+RFID Positioning Based on Extended Kalman Filter EKF and Particles Filter PF

Sidi Ahmed Bendoukha1, Keichi Okuyama1, Roberto Garello2

1Kyushu Institute of Technology, Japan, 2Politecnico di Torino, Italy

### VLBI Tracking Measurement of Chang’E-3

Qinghui Liu

Shanghai Astronomical Observatory, China

### Progress of Search Operation for IKAROS by Means of Open-Loop Tracking Data

Shota Kikuchi1, Hiroshi Takeuchi2, Osamu Morii2, Yuya Mimasu2, Yoji Shirasawa2, Hideki Kato2, Naoko Ogawa3, Sho Taniguchi3

1The University of Tokyo, Japan, 2JAXA, Japan, 3Fujitsu Limited, Japan

### Sensor Payload Space Radiation of Small Deep Space Probe SHINEN-2

Sidi Ahmed Bendoukha1, Keichi Okuyama1, Premkumar Saganti3, Doug Holland2
## [j-2] Broadcast and Communication Systems

### Session Date
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### Room
Kobe International Conference Center, Meeting Room 502

### Chairpersons
- Naoko Yoshimura (National Institute of Information and Communications Technology, Japan)
- Masazumi Ueba (Muroran Institute of Technology, Japan)

### 2015-j-06 (11:00 - 11:20)
**Conceptual Study on Global Broadband Satellite Communication Systems for the Next Generation Engineering Test Satellite**

Amane Miura, Takashi Takahashi, Naoko Yoshimura, Hiroyuki Tsuji, Maki Akioka, Shinichi Taira, Morio Toyoshima  
National Institute of Information and Communications Technology, Japan

### 2015-j-07 (11:20 - 11:40)
**Feasibility Study of Broadband Satellite Communications System for Research Vessel**

Naoko Yoshimura, Takashi Takahashi, Amane Miura, Morio Toyoshima  
National Institute of Information and Communications Technology, Japan

### 2015-j-08 (11:40 - 12:00)
**Development of Dynamic Moving Network with Satellite for Emergency Vehicles**

Byeong-pyo Jeong, Yasunori Owada, Norihiko Katayama, Takashi Takahashi, Kiyoshi Hamaguchi, Morio Toyoshima  
National Institute of Information and Communications Technology, Japan

### 2015-j-09 (12:00 - 12:20)
**Study on Hybrid Satellite Tracking Antenna Control System using Torque Compensation Methods for Small-Vessels**

Masazumi Ueba1, Kouhei Suzaki2, Takatoshi Sugiyama2  
1Muroran Institute of Technology, Japan, 2NTT Corporation, Japan

### 2015-j-10 (12:20 - 12:40)
**Development of Aeronautical Earth Station for WINDS**

Norihiko Katayama, Takashi Takahashi, Maki Akioka, Shinichi Taira  
The National Institute of Information and Communications Technology, Japan

## [j-3] Experimental Results

### Session Date
July 8 (Wed) 15:00 – 16:20

### Room
Kobe International Conference Center, Meeting Room 502

### Chairpersons
Hajime Fukuchi (Tokyo Metropolitan University, Japan)  
Dimitar Radkov Kolev (NICT, Japan)

### 2015-j-11 (15:00 - 15:20)
**Transmission and Functionality Test of MMT-Based Next-Generation Satellite Broadcasting System over “KIZUNA (WINDS)” Satellite**

Yuki Kawamura, Masaaki Kojima, Yoichi Suzuki, Kazuhiro Otsuki, Naoyoshi Nakamura, Takeshi Kimura, Shoji Tanaka  
NHK Science & Technology Research Laboratories, Japan

### 2015-j-12 (15:20 - 15:40)
**Time Diversity Evaluation for Attenuation Mitigation Method using Attenuation Data in Thailand and Japan**

Peeramed Chodkaveekityada1, Hajime Fukuchi1, Tulaya Limpil2, Pornchai Supnithi2  
1Tokyo Metropolitan University, Japan, 2King Mongkut’s Institute of Technology Ladkrabang, Thailand

### 2015-j-13 (15:40 - 16:00)
**Results of the Initial In-Orbit Test for an X-Band Multi-Mode High-Speed-Modulator on Alos-2 Satellite**

Kazuya Inaoka1, Yoshiyuki Tashima1, Masanobu Yajima1, Toshiyuki Ukeba2, Futaba Ejima2  
1JAXA, Japan, 2Mitsubishi Electric Corp., Japan

### 2015-j-14 (16:00 - 16:20)
**A Simple Design for Lunar Multi Aperture Scintillation Sensor**

Dimitar Kolev1, Kenji Higa2, Yoshishika Takayama1, Morio Toyoshima1
Advanced Technologies for space communications

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<td>Tomoaki Toda (JAXA, Japan)</td>
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<td>Masayoshi Yoneda (NEC Space Technologies, Ltd., Japan)</td>
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2015-j-15 (17:00 - 17:20)

Initial Report of Satellite-ground Laser Communication Experiment using Small Optical Transponder (SOTA)
Yasushi Munemasa, Hideki Takenaka, Dimitar Kolev, Naohiko Iwakiri, Maki Akioka, Yoshisada Koyama, Hirono Kunimori, Yoshishisa Takayama, Morio Toyoshima
National Institute of Information and Communications Technology, Japan

2015-j-16 (17:20 - 17:40)

OOK Modulated Optical Satellite Communications System for CCSDS Standardization
Naohiko Iwakiri, Yoshishisa Takayama, Morio Toyoshima
NICT, Japan

2015-j-17 (17:40 - 18:00)

Intra-Spacecraft Wireless Link and Its Application to Spacecraft Environmental Tests
Tomoaki Toda1, Naoya Kukutsu2, Shoichi Kitzawa2, Susumu Arorld, Hirokazu Kamoda2, Tomoaki Kumagai2, Kiyoshi Kobayashi2, Masataka Ohira1, Satoru Shimizu4
1ISAS/JAXA, Japan, 2ATR, Japan, 3Kakuta University, Japan, 4Oki Electric Industry, Japan

2015-j-18 (18:00 - 18:20)

The Digital Modulation System with the Concealed Data Recovery Method
Mitsuhisa Yamaji1, Yuichi Yamaguchi1, Masayoshi Yoneda1, Kenji Suzuki2, Morio Toyoshima2
1NEC Space Technologies, Ltd., Japan, 2National Institute of Information and Communications Technology, Japan

2015-j-19 (18:20 - 18:40)

Proposal and Results of an Automatic Operation System for Nano Satellites Using Multiple Ground Stations
Kei Ohta1, Masaya Kogo1, Sota Suzuki1, Kazuysahi Miyasato1, Shota Kawajiri1, EuGene Kim1, Saburo Matunaga2
1Tokyo Institute of Technology, Japan, 2ISAS/JAXA, Japan

Near Earth Missions and Technologies (1) : Balloons to LEO

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<td>Chairpersons</td>
<td>Alfred Bing-Chih Chen (National Cheng Kung University, Taiwan)</td>
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2015-k-01 (9:00 - 9:20)

FUJIN-2 : Balloon Borne Telescope for Optical Observations of Planets
Yasuhiro Shigo1, Makoto Taguchi2, Toshikite Nakano3, Atsunori Maeda4, Masatoka Ima4, Yuya Gouda4, Makoto Watanabe4, Yihiro Takahashi4, Yuji Sakamoto5, Kazuya Yoshida6
1Osaka University, Japan, 2Rikkyo University, Japan, 3Oita National College of Technology, Japan, 4Hokkaido University, Japan, 5Tohoku University, Japan

2015-k-03 (9:20 - 9:40)

Development of a Mobile Operational System for Small High-Altitude Balloons Evaluated by a Collaborative Flight Experiment
Hiroki Kono
Kochi University of Technology, Japan

2015-k-04 (9:40 - 10:00)

Development of the Solar Extreme Ultraviolet Probe for Cubesats
Alfred Bing-Chih Chen1, Heath Tsu-Wei Tsau1, Wen-Hao Chen1, Jyh-Ching Juang1, Koichiro Oyama1,2
1National Cheng Kung University, Taiwan, 2Kyushu University, Japan

2015-k-05 (10:00 - 10:20)

The Launch and First Year Orbital Operation of the TANPOPO Mission onboard the ExHAM at the ISS Kibo Exposed Facility
Hajime Yano1, Akiko Yamagishi2, Hirofumi Hashimoto3, Shin-ichi Yokobori3, Yoko Kikukawa3, Yuko Kawaguchi3, Kensei Kobayashi3, Hikaru Yabuta2, Makoto Tabata3, Masumi
[k-2] Near Earth Missions and Technologies (2) : LEO to the Lagrange Points

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<td>Peter Tsou (Sample Exploration System, USA)</td>
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2015-k-06 (15:00 - 15:15)

Test Result of Key Mechanical Functions for a Super Multi-DoF and Extendable Space Robotic Arm
Yuichiro Tanaka, Kent Yoshikawa, Naoki Ueda, Hiroki Nakanishi, Mitsushige Oda
Tokyo Institute of Technology, Japan

2015-k-07 (15:15 - 15:30)

LIDAR for Rendezvous and Docking, 3D-Imaging, Debris Removal and Robotic Support
Bettina Möbius1, Florian M. Kolb1, Michael Windmüller1, Mario Rüdiger1, Pierre Casiez2, Bruno Cavros2, Olivier Mongrand3
1Jena-Optronik, Germany, 2Airbus Defence and Space, France, 3ESTRACK, The Netherlands

2015-k-09 (15:30 - 15:45)

DESTINY - A Technology Demonstrator for Deep Space Exploration
Yasuhiro Kawakatsu, Ikiko Funaki, Kazutaka Nishiyama, Akira Oyama, Hiroyuki Toyota, Takayuki Yamamoto, Takahiro Ikawa
ISAS/JAXA, Japan

2015-k-10 (15:45 - 16:05)

DESTINY Trajectory Design
Takayuki Yamamoto1, Chi Ho Yung1, Stefano Campagnola1, Yoshihide Sugimoto2, Akira Oyama3, Tomoaki Tatsukawa3, Chikako Hirose3, Toshinori Ikenaga4, Yasuhiro Kawakatsu5, Satoshi Ogura5, Shunsuke Sato5, et al
1JAXA, Japan, 2The University of Tokyo, Japan

2015-k-11 (16:05 - 16:25)

Operation by Script for DESTINY Mission: An Experiment of an Onboard Autonomous Mission Operation Technology
Yosuke Fukushima, Yasuhiro Kawakatsu
ISAS/JAXA, Japan

[k-3] From the Lagrange Points to Outer Planets

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<td>Yasuhiro Kawakatsu (JAXA, Japan)</td>
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2015-k-12 (17:00 - 17:20)

Studies on Solar System Explorations using DESTINY: The Demonstration and Experiment of Space Technology for Interplanetary Voyage
Takahiro Ikawa1, Yasuhiro Kawakatsu1, Go Murakami2, Yuichiro Ezoe2, Shingo Kameda3, Kunihiro Keika4, Tomoko Arare5, Shuji Matsuura5, Takanao Saeki6, Takeshi Imamura7, Kazunori Ogihara8, Akira Oyama9, Toshinori Ikenaga9, Hiroyuki Toyota10, Ikko Funaki11
1ISAS/JAXA, Japan, 2Tokyo Metropolitan University, Japan, 3Rikkyo University, Japan, 4Tohoku University, Japan, 5Chiba Institute of Technology, Japan, 6University Shiga Prefecture, Japan, 7JAXA, Japan

2015-k-13 (17:20 - 17:40)

Exploration of Jovian System by JUICE Mission: Towards Understanding the Habitable Environments among Icy Moons
Sho Sasaki1, Yoshifumi Saito2, Masaki Fujimoto2, Jun Kimura2, Yasumasa Kasai3, Nonyuki Namiki3, Yasuhito Sekine4, JUICE JAPAN Working Group2
1Osaka University, Japan, 2JAXA, Japan, 3Tokyo Institute of Technology, Japan, 4Tohoku University, Japan

2015-k-14 (17:40 - 18:00)

Jovian Trojan Asteroid Exploration by Solar Power Sail-Craft
Osamu Moroi, Takanao Sakai, Yoji Shirasawa, Hideto Kato, Go Onda, Jun Matsumoto, Yoshio Chuno, Shota Kikuchi, Yuki Teramoto, Yusuhi Oki, Kosuke Akatsuka, Shuji Matsuura, Hajime Yano, Ryosuke Nakamura, Yoko Kebukawa, Jun Aoki, Junichiro Kawaguchi
1JAXA, Japan, 2The University of Tokyo, Japan, 3Rikkyo University, Japan, 4Yokohama National University, Japan, 5Osaka University, Japan, 6Tokyo University, Japan
### Development of Sampling Package for Trojan Asteroid Exploration Mission

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### Sample Collection from Enceladus

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<td>Peter Tsou1, Ariel Anbar2, Kathrin Alteggi3, John Baross4, Donald Brownlee5, Richard Dills6, Daniel Glavin7, Christopher Glie8, Yuki Kani9, Christopher McKay10, Yasuho Sekine11, Ken Takai12, Yoshimi Takano13, Peter Williams14, Hajime Yano15</td>
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### Marcy and Moon (1) - Science and Instrumentation

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### The BepiColombo Spacecraft and Its Mission to Mercury

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### X-ray Emission using the Pyroelectric Crystal for the Active X-ray Spectrometer

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<tr>
<td>Chairpersons</td>
<td>Masayuki Naito1, Nobuyuki Hasebe1, Hiroki Kusano1, Hiroshi Nagao2, Haruyoshi Kun1, Eido Shibamura1, Jose A. Matias Lopes2</td>
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### The Spatial Distribution of Gamma Rays Observed by Kaguya (SELENE) Gamma-Ray Spectrometer

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<td>Ryosuke Hayashida, Hiroshi Nagao, Hiroki Kusano, Eido Shibamura, Masayuki Naito, Nobuyuki Hasebe</td>
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### Seismic Observation using the Broad-Band Seismometers Targeted for Moonquake

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<td>Ryuhiei Yamada1, Hiroshi Shiros, Tanguy Nebot2, Philippe Lognonne3, Kazuyoshi Asari1, Satoshi Tanaka2</td>
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### Study on Dynamics of Penetrator into Ice

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### Moon (2) - Surface Exploration and Utilization-1

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### Key Technology Development for Future Lunar Utilization

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<tr>
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<td>Takeshi Hoshino1, Sachiko Wakabayashi1, Shoichi Yoshinari2, Naoko Hatanaoka2</td>
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### Experimental Study of Lunar Drilling

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<td>Sachiko Wakabayashi, Takeshi Hoshino, Shoichi Yoshinari</td>
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Design of a Modular Transportation System for Future Lunar Robotic Missions
Etienne Dumont
DLR German Aerospace Center, Germany

Overview on Mitigation and Utilization Technologies of Regolith Particles for Lunar, Mars, and Asteroid Exploration
Hiroyuki Kawamoto
Waseda University, Japan

Transport of Regolith Utilizing Dielectric Elastomer Actuator for In-Situ Resource Utilization on Moon and Mars
Masato Adachi, Kazuaki Nogami, Hiroyuki Kawamoto
Waseda University, Japan

System Architecture of a Lunar Industry Plant using Regolith
Roland Antonius Gabrielli1, Jürgen Seelmann1, Agnes Großmann1, Georg Herdrich1, Stefanos Fasoulas1, Peter Schnaufler1, Peter Middendorf1, Miranda Fater1, Andreas Gebhardt2
1Stuttgart University, Germany, 2FH Aachen University of Applied Sciences, Germany

Overview of the MultiRob 3D Lunar Industrial Development Project
Agnes Großmann1, Roland Antonius Gabrielli1, Georg Herdrich1, Stefanos Fasoulas1, Peter Schnaufler1, Peter Middendorf1, Miranda Fater1, Andreas Gebhardt2
1Stuttgart University, Germany, 2FH Aachen University of Applied Sciences, Germany

Mission Concepts of Unprecedented Zipangu Underworld of the Moon Exploration (UZUME) Project
Junichi Haruyama1, Isao Kawano1, Takashi Kubota1, Masatsugu Otsuki1, Hiroki Kato1, Toshikho Nishibori1, Takahiro Iwata1, Yukio Yamamoto1, Yoshiki Ishitahara1, Aiko Nagamatsu1, Kazuto Shimada1, Toshiki Hasenaka2, Tomokatsu Morota1, Masaki N. Nishino2, Ko Hashizume3, Kazuto Sakai3, Motomaro Shirao3, Goro Komatsu3, Nobuyuki Hasebe2, Hisayoshi Shimizu2, Hiroki Yamamoto2, Kenri Kobayashi2, Shinsuke Yokota1, Tatsuhiko Michikami1, Saburo Yamamoto1, Yasuhiro Yokota1, Hirosi Arami1, Genya Ishigami2, Katsushi Futami7
1JAXA, Japan, 2Kumamoto University, Japan, 3Nagoya University, Japan, 4Osaka University, Japan, 5Planetary Geology Institute, Japan, 6University of Amurino, Italy, 7Waseda University, Japan, 8University of Tokyo, Japan, 9Okayama National University, Japan, 10Tokyo University of Pharmacy and Life Sciences, Japan, 11Keio University, Japan, 12National Institute for Environmental Studies, Japan, 13National Institute of Advanced Industrial Science and Technology, Japan, 14Keio University, Japan, 15Toyo University of Technology, Japan, 16National Institute of Radiological Sciences, Japan

UZUME Project: Search for Water in Lunar Holes
Ko Hashizume1, Chihito Yamanaka1, Ryota Hasunaka1, Jun-ichi Haruyama1
1Osaka University, Japan, 2JAXA, Japan

Stratigraphy of Lunar Mare Basalts and Importance of Lunar Hole Studies
Tomokatsu Morota
Nagoya University, Japan
Radiation Environment on the Moon - On the Lunar Surface and inside the Vertical Hole of the Moon -
Nobuyuki Hasebe¹, Takuma Sató¹, Hiroki Kusano¹, Hiroshi Nagashima¹, Sota Shimizu¹, Ryousuke Hayashida¹, Aiko Nagamatu², Jun’ichi Haruyama²
¹Waseda University, Japan, ²Japan Aerospace Exploration Agency (JAXA), Japan

Construction of Secure Medical Base of Radiation Emergency to Support Human Activities on the Moon in UZUME Project
Yuichi Michikawa¹, Junichi Haruyama²
¹National Institute of Radiological Sciences, Japan, ²JAXA, Japan

Concept of Inflatable Rover for Exploration of Lunar and Planetary Holes and Subsurface Caverns
Katsushi Funutani
Toyota Technological Institute, Japan

Preparing for Volcano Tubes Analogue Exploration in Reunion Island
Alain Bertil¹, Guy Pignolet², Kiran Chincholi³
¹Cite du Volcan, La Reunion, ²Reunion Island Space Initiative, La Reunion, ³University of Applied Sciences Wiener Neustadt, Austria

Japan’s Mars Rover Mission – System Design & Development Status
Kazuhisa Fujita¹, Gen’ya Ishigami², Ryuta Hatakenaka¹, Moto Takai¹, Hiroki Toyota¹, Misuzu Haruki¹, Hiroshi Takeuchi¹, Taku Nonomura¹, Kazuhiko Yamada¹, Hiroki Takayanagi¹, Takashi Ozawa¹, Shingo Matsuyama¹, Akira Oyama¹, Akihiko Yamagishi¹, Shingo Kameda¹, Hidey Miyamoto⁵, Takehiko Satoh¹
¹JAXA, Japan, ²Keio University, Japan, ³Tokyo University of Pharmacy and Life Sciences, Japan, ⁴Tokyo University of Pharmacy and Life Sciences, Japan, ⁵The University of Tokyo, Japan

Orbit Design, Orbit Determination and Aerodynamic Guidance for Mars EDL and Surface Exploration Technologies Demonstrator
Naoko Ogawa, Misuzu Haruki, Yoshinari Kondo1, Shuichi Matsuimoto, Hiroki Takeuchi, Kazuhisa Fujita
JAXA, Japan

Mission Scope Definition and Preliminarily Design Study of Mars Surface Exploration Rover
Genya Ishigami¹, Kazuhisa Fujita², Ryuta Hatakenaka³, Hiroki Toyota¹, Takehiko Satô¹, Moto Takai¹, Taku Nonomura²
¹Keio University, Japan, ²JAXA, Japan

LDM (Life Detection Microscope): In Situ Imaging of Living Cells on Surface of Mars
Akihiko Yamagishi¹, Takehiko Satô¹, Keigo Enya², Atsuie Miyakawa¹, Yoshitaka Yoshimura¹, Hajime Honda¹, Eichi Imaura¹, Satoshi Sasahara¹, Genya Ishigami², Hirohide Demura², Kazuhisa Fujita¹, Hideaki Miyamoto³
¹Tokyo University of Pharmacy and Life Sciences, Japan, ²JAXA, Japan, ³Tamagawa University, Japan, ⁴Nagasaki Institute of Technology, Japan, ⁵Tokyo University of Technology, Japan, ⁶Keio University, Japan, ⁷Aizu University, Japan, ⁸The University of Tokyo, Japan

Design and Development of Navigation/Geological Cameras for a Mars Rover
Takehiko Satô¹, Hideaki Miyamoto², Takahumi Nihara², Genya Ishigami³
¹JAXA, Japan, ²University of Tokyo, Japan, ³Keio University, Japan
### Session Date: July 9 (Thurs) 11:00 – 12:20

**Venue:** Kobe International Conference Center, Meeting Room 402

**Chairpersons:**
- Akihiko Yamagishi (Tokyo University of Pharmacy and Life Sciences, Japan)
- Naoko Ogawa (JAXA, Japan)

#### 2015-k-42 (11:00 – 11:20)

**Title:** An In-Situ Dating Instrument Package for a Future Mars Rover Mission

**Authors:**
- Yuichiro Cho¹, Shingo Kameda¹, Yayoi N. Miura², Yoshifumi Saito³, Shochiro Yokota³, Satoshi Kasahara⁴, Ryuji Okazaki⁵, Kazuo Yoshikawa⁶, Kazuo Shibasaki⁷, Takahiro Oshii⁸, Misako Umeayama⁹, Seiji Sugita²

¹Rikkyo University, Japan, ²University of Tokyo, Japan, ³ISAS/JAXA, Japan, ⁴Kyushu University, Japan

#### 2015-k-43 (11:20 – 11:40)

**Title:** Dust and Discharge Environmental Studies with Onboard Hazard Analyses around a Martian Rover by Electro-Magnetic and Acoustic Wave Measurements

**Authors:**
- Masa-yuki Yamamoto¹, Mitsuteru Sato², Keigo Ishisaka³, Yukihiro Takahashi², Kazunori Oghara¹, Masashi Kamogawa⁴, Hideaki Miyamoto²

¹Kochi University of Technology, Japan, ²Hokkaido University, Japan, ³Toyama Prefectural University, Japan, ⁴University of Shiga Prefecture, Japan, ⁵Tokyo Gakugei University, Japan, ⁶University of Tokyo, Japan

#### 2015-k-44 (11:40 – 12:00)

**Title:** Automated Dust Devil Detection on Mars

**Authors:**
- Kazunori Oghara¹, Daiki Yasunaga¹, Genya Ishigami²

¹University of Shiga Prefecture, Japan, ²Keio University, Japan

#### 2015-k-45 (12:00 – 12:20)

**Title:** A Parametric Study of Mars Airplane Concept for Science Mission on Mars

**Authors:**
- Koji Fujita¹, Hiroki Nagai², Akira Oyama²

¹Tohoku University, Japan, ²JAXA, Japan

### Session Date: July 9 (Thurs) 14:00 – 15:40

**Venue:** Kobe International Conference Center, Meeting Room 402

**Chairpersons:**
- Masa-yuki Yamamoto (Kochi University of Technology, Japan)
- Yuichiro Cho (Rikkyo University, Japan)

#### 2015-k-46 (14:00 – 14:20)

**Title:** Development of Mars Exploration Aerial Vehicle in Japan

**Authors:**
- Hiroki Nagai¹, Akira Oyama², Mars Airplane WG

¹Tohoku University, Japan, ²JAXA, Japan

#### 2015-k-47 (14:20 – 14:40)

**Title:** Aerodynamic Challenges to Realize Mars Airplane

**Authors:**
- Hiroki Nagai¹, Masayuki Anyoji², Taku Nonomura³, Akira Oyama², Masato Okamoto⁴, Gaku Sasaki⁵, Takaaki Matsumoto⁵, Kouichi Yonemoto³, Kasahiro Kanazaki⁶, Shigeru Sunada⁷, Koichi Yonezawawa⁵, Masaru Koike², Koji Fujita¹, Keisuke Asai¹, Kozo Fuji³

¹Tohoku University, Japan, ²Kyushu University, Japan, ³JAXA, Japan, ⁴Kanazawa Institute of Technology, Japan, ⁵Kyushu Institute of Technology, Japan, ⁶Tokyo Metropolitan University, Japan, ⁷Osaka Prefecture University, Japan, ⁸Osaka University, Japan, ⁹Osaka Institute of Technology, Japan

#### 2015-k-48 (14:40 – 15:00)

**Title:** Variable-Pressure Wind Tunnel Test of Airfoils at Low Reynolds Numbers Designed for Mars Exploration Aircraft

**Authors:**
- Takahiro Makizono¹, Koichi Yonemoto³, Takaaki Matsumoto⁵, Gaku Sasaki¹, Kota Tanaka¹, Hiroshi Tsukamoto¹, Keisuke Ikeda¹, Hiroshi Ochi²

¹Kyushu Institute of Technology, ²National Institute of Technology

#### 2015-k-49 (15:00 – 15:20)

**Title:** Multi-Objective Design of Airfoil for Martin Airplane considering Trailing Edge Thickness

**Authors:**
- Motohiro Utsugi¹, Masahiro Kanazaki¹, Takayuki Sato¹, Kisa Matsushima²

¹Tokyo Metropolitan University, Japan, ²University of Toyama, Japan

#### 2015-k-50 (15:20 – 15:40)

**Title:** Reynolds Number Dependence of Airfoil Shape and Aerodynamic Characteristics at Low Reynolds Number

**Authors:**
- Donghe Lee¹, Taku Nonomura², Akira Oyama³, Kozo Fuji²

¹The University of Tokyo, Japan, ²JAXA, Japan

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**[k-11] Mars (4) - Aerial Probe Engineering-2**

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<td>Kazunori Ogohara (University of Shiga Prefecture, Japan)</td>
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**2015-k-51 (16:00 - 16:20)**

**Aerodynamic Characteristics of Airfoils with Different Aspect Ratio behind Propeller Slipstream in Low Reynolds Number Condition**

Hiroki Nagai, Kotaro Watanabe, Koji Fujita

Tohoku University, Japan

**2015-k-52 (16:20 - 16:40)**

**A Study on Interference Effect between a Main Wing and a Propeller of a Mars Airplane**

Shogo Matsumoto¹, Shigeru Sunada¹, Koichi Yonezawa², Genki Nakai², Kento Abe¹, Naoki Yoshida²

¹Osaka Prefecture University, Japan, ²Osaka University, Japan

**2015-k-53 (16:40 - 17:00)**

**Airplane Propeller Design in Low-Reynolds Number Flows**

Naoki Yoshida¹, Genki Nakai¹, Koichi Yonezawa¹, Kento Abe¹, Shigeru Sunada¹, Kazuyasu Sugiyama¹

¹Osaka University, Japan, ²Osaka Prefecture University, Japan

**2015-k-54 (17:00 - 17:20)**

**Multiobjective Design Exploration of Airfoil Section Shape of a Propeller at Low-Reynolds and High-Mach Numbers Conditions Towards the Mars Airplane**

Seiichiro Morizawa¹, Taku Nonomura², Shigeki Oabayashi¹, Akira Oyama², Kozo Fuji²

¹Tohoku University Japan, ²JAXA, Japan

**2015-k-55 (17:20 - 17:40)**

**Flight Test of Small Unmanned Air Vehicle Propelled by Microwave Power Transmission in Anechoic Chamber**

Takaaki Matsumoto¹, Koichi Yonemoto¹, Kozo Yamashita², Satoshi Watanabe², Tomohiko Mitani³, Masashi Iwashimizu³, Akito Kasawo³, Itaru Tama³, Gaku Sasaka³, Koyo Matsuizaki³

¹Kyushu Institute of Technology, Japan, ²Salesian Polytechnic, Japan, ³Kyoto University, Japan

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**[k-12] Mars (5) - Robotics and Human Missions**

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<td>Chairperson</td>
<td>Takahiro Iwata (JAXA, Japan)</td>
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**2015-k-56 (9:40 - 10:00)**

**A Study on Path Planning Method for Multi Exploration Robots Taking Account of Communication Transmissibility**

Yohei Ota, Shin-Ichi Hiro Nishida, Masashi Miura

The University of Tottori, Japan

**2015-k-57 (10:00 - 10:20)**

**Experimental Verification on Enabling Long Distance Travel for Planetary Rover using Scanning LRF System**

Kai Yun, Yutaka Kiyo, Shinji Hokamoto

Kyushu University, Japan

**2015-k-58 (10:20 - 10:40)**

**Trade Study of Spacecraft Design for Manned Mars Flyby**

Koki Tanaka¹, Daichi Nakajima², Shota Iino³, Enku Moriyama³, Hinyuki Miyajima⁴

¹Keio University, Japan, ²Tokyo University of Agriculture and Technology, Japan, ³Space Systems Development Corporation, Japan, ⁴Tokyo Jogakkan College, Japan

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**[k-13] Small Bodies (1) - Hayabusa-2**
### Session Date: July 10 (Fri) 11:00 – 12:40

**Room:** Kobe International Conference Center, Meeting Room 402

**Chairpersons:**
- Daniel J. Scheeres (University of Colorado, USA)
- Hitoshi Kuninaka (JAXA, Japan)

#### 2015-k-61 (11:00 - 11:20)
**Deep Space Exploration of Hayabusa-2 Spacecraft**

Hitoshi Kuninaka, Hayabusa-2 Project

JAXA, Japan

#### 2015-k-62 (11:20 - 11:40)
**Development of Hayabusa-2 Sample Return Capsule**

Keisuke Yoshitaka, Tetsuya Yamada, Kazuhiro Yamada, Takayuki Shimoda

Japan Aerospace Exploration Agency, Japan

#### 2015-k-63 (11:40 - 11:55)
**Development of Micro Deployable Came (DCAM3) System on HAYABUSA2, and Overview of DCAM3 Mission**

Hirotaka Sawada1, Kazunori Ogawa1, Kei Shirai1, Yuya Mimatsu1, DCAM3 Development Team2

1JAXA, Japan. 2Tokyo University of Science, Kobe University, Chiba Institute of Technology, Kochi University, The University of Tokyo, Japan

#### 2015-k-64 (11:55 - 12:10)
**Scientific Camera System in Hayabusa-2 DCAM3: Its Objective and System Configuration for Observation of SCI Asteroid Impact Experiment**

Kazunori Ogawa1, Kei Shirai1, Masahiko Arakawa2, Hirotaka Sawada1, Koji Wada3, Rie Honda4, Ko Ishibashib, Naoya Sakatamai, Takanao Sakii

1JAXA, Japan. 2Kobe University, Japan. 3PERC/Chiba Institute of Technology, Japan. 4Kochi University, Japan. 5The Graduate University for Advanced Studies, Japan

#### 2015-k-65 (12:10 - 12:25)
**Performances of Flight Model of NIRS3: The Near Infrared Spectrometer on Hayabusa-2**

Takahiro Iwata1, Kohei Kitazato2, Masanao Abe1, Takahiko Arii3, Yusuke Nakamura1, Tomoki Nakamura4, Takahiro Hiroi5, Moe Matsuoka4, Shuji Matsuura1

1ISAS/JAXA, Japan. 2University of Aizu, Japan. 3Graduate University for Advanced Studies, Japan. 4Tohoku University, Japan. 5Japan Atomic Energy Agency, Japan. 6Brown University, USA

#### 2015-k-66 (12:25 - 12:40)
**Thermal Infrared Imager on Hayabusa2 for Observation of Thermo-Physical Properties of C-Class Asteroid (162173) 1999JU3**

Tatsuaki Okada1, Tetsuya Fukuhara2, Satoshi Tanaka1, Makoto Taguchi3, Takeshi Imamura1, Takahito Osawa3, Takahiro Hiroi6, Moe Matsuoka4, Shuji Matsuura1

1JAXA, Japan. 2Hokkaido University, Japan. 3Rikkyo University, Japan. 4Chiba Institute of Technology, Japan. 5University of Aizu, Japan. 6AIST, Japan

### Session Date: July 10 (Fri) 14:00 – 15:40

**Room:** Kobe International Conference Center, Meeting Room 402

**Chairpersons:**
- M. Reza Emami (University of Toronto, Canada)
- Tatsuaki Okada (JAXA, Japan)

#### 2015-k-67 (14:00 - 14:20)
**Going Beyond the Possible, Going Beyond the “Standard” of Spacecraft Integration and Testing! – A Summary of the DLR Mascot AIV Activities within the Hayabusa-2 Project from the First Unit Hardware Test to Final Check-out before Launch –**

Christian D. Grimm1, Jan-Thimo Grundmann2, Jeffrey Hendrikse3, Nawarat Termtanasombat4, Christian Ziach1

1Institute of Space Systems, German Aerospace Center (DLR), Germany. 2Airbus Defence and Space, Germany

#### 2015-k-68 (14:20 - 14:40)
**MASCOT Operations and Status after Launch**

Christian Krause1, Jens Biele1, Muriel Deleuze2, Jan Thimo Grundmann2, Tra-Mi Ho3, Kagan Kaya1, Caroline Lange2, Tatsu Okada4, Stephan Ulamec1, Christian Ziach3, MASCOT team

1DLR Microgravity User Support Center (DLR-U), Germany. 2CNES Centre National d’Etudes Spatiales, France. 3DLR Institute for Space Systems, Germany. 4Jaxa Japan Aerospace Exploration Agency

#### 2015-k-69 (14:40 - 14:55)
**HARMONICS2: A Visualization Tool for Hayabusa2 Mission**

Wataru Ueno, Naru Hirata, Hirohide Demura

The University of Aizu, Japan

#### 2015-k-70 (14:55 - 15:10)
**Space Weathering of Asteroids: Lessons from Itokawa for Future Missions**

Sho Sasaki1, Takahiro Hiroi2, Masateru Ishiguro3, Mizuki Okazaki2, Rosario Brunetto4

1JAXA, Japan. 2Kobe University, Japan. 3Chiba Institute of Technology, Japan. 4Brown University, USA
### 2015-k-71 (15:10 - 15:25)

**Experimental Study on Impact into Granular Materials under Simulated Reduced Gravities**

Masato Kiuchi, Akiko Nakamura  
Graduate School of Science, Kobe University

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### 2015-k-72 (15:25 - 15:40)

**Risk Strategy of Asteroid Collisions to the Earth at Extraterrestrial Stations**

Yasunori Miura  
Yamaguchi University, Japan

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### [k-15] Small Bodies (3) - Mission Design and Enabling Technologies

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</table>
| Chairpersons       | Sho Sasaki (Osaka University, Japan)  
Takeo Watanabe (Teikyo University, Japan) |

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### 2015-k-73 (16:00 - 16:20)

**Analysis on Motion Control Based on Reaction Null Space for Ground Grip Robot on an Asteroid**

Yudai Yuguchi1, Warley F.R. Ribeiro2, Kenji Nagaoka1, Kazuya Yoshida1  
1Tohoku University, Japan, 2Pontifical Catholic University of Minas Gerais, Brazil

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### 2015-k-74 (16:20 - 16:40)

**Penetration Dynamics of an Asteroid Sampling System Inspired by Japanese Sword Technology**

Takeo Watanabe1, Hiroshi A. Fujii2, Takeshi Sakamoto3, Genrokuro Matsunaga4  
1Teikyo University, Japan, 2Tokyo Metropolitan University & TMIT Co., Ltd., Japan, 3Kumamoto University, Japan, 4Matsunaga Japanese swords forging laboratory, Japan

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### 2015-k-75 (16:40 - 17:00)

**Spacecraft Formation for Asteroid Redirection**

Michael C. F. Bazzocchi, M. Reza Emami  
University of Toronto Institute for Aerospace Studies, Canada

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### 2015-k-76 (17:00 - 17:20)

**Exploration of Rubble Pile Body Geophysics by Missions to NEA Binaries**

D. J. Scheeres  
The University of Colorado, USA

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### [n-1] SAR & Remote Sensing Applications (1)

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| Chairpersons       | Ryo Natsuaki (JAXA, Japan)  
Yukihiro Kankaku (JAXA, Japan) |

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### 2015-n-01 (17:00 - 17:20)

**The Results of Initial Evaluation of PALSAR-2**

Yukihiro Kankaku, Shinichi Suzuki  
JAXA, Japan

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### 2015-n-03 (17:20 - 17:40)

**Detection of Oil Spill Variations from SAR Imagery at the Coastal Region of the Yellow Sea and its Potential Causes**

Tae-Sung Kim1, Kyung-Ae Park1, Xiaofeng Li2, Moonjin Lee3, Sungwook Hong4, Sang Jin Lyu5, Sooyong Nam5  
1Seoul National University, Korea, 2NESDIS / NOAA, USA, 3HRISO, Korea, 4NMSC, Korea, 5GeoSystem Research Inc., Korea

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### 2015-n-04 (17:40 - 18:00)

**Clarification of the DinSAR image with Local Co-registration Method using Singular Points and Amplitude Information**

Ryo Natsuaki, Manabu Watanabe, Takeshi Motooka, Masato Ohki, Masanobu Shimada
Development of Large Scale Flood Detection Method by Integrating Historical Global Record Using Microwave Remote Sensing

LI Xi, Wataru Takeuchi
The University of Tokyo, Japan

Result of Hodoyoshi-3 and -4 Earth Observation Missions
Yoshihide Aoyanagi1, Akira Iwasaki1, Shinichi Nakasuka1, Takui Ebinuma1, Shinichii Kimura2, Tomohiro Narumi2
1The University of Tokyo, Japan, 2Tokyo University of Science, Japan

On-Board Satellite Image Recognition Using Deep Neural Network
Ryuhei Hamaguchi1, Shinichi Nakasuka1, Ryotaro Takeda2
1The University of Tokyo, Japan, 2PASCO, Japan

Remote Sensing Camera for the Satellite Project Condor UNAM-MAI
Ricardo Arturo Vázquez Robledo1, Paulo César Becerril González1, Miguel Ángel Alvarado Zaragoza2, Gerardo Gómez Soto1, Raúl Del Toro Morales1, Oscar Mérida Guzmán1, Israel Vargas Galván1, Alberto Cordero Dávila2, Edgar Martínez Pascual2, Saúl De la Rosa Nieves1, et al.
1National Autonomous University of Mexico, Mexico, 2Autonomous University of Puebla, Mexico

The DEIMOS-2 Mission: From Kick-Off to LEOP and Commissioning
Sergio Molina Gomez, Pablo Gallego Sanmiguel
Elecnor Deimos Satellite Systems, Spain

ICARUS - A Concept for Unprecedented Observation of Small Animals Based on Satellites
Paul Ehnhardt1, Reinhard Gregor Birmuske1, Martin Wikelski2
1SpaceTech GmbH Immenstaad, Germany, 2Max-Planck Institute for Ornithology and University of Konstanz, Germany

Tropical Rainfall Measurement Mission (TRMM) Operation Summary
Tomomi Nio1, Susumu Saito1, Enich F. Stocker2, James H. Pawloski3, Yoshifumi Murayama4, Takeshi Ohata4
1JAXA/SAOC, Japan, 2PPS, NASA/GSFC, USA, 3ESMO, NASA/GSFC, USA, 4RESTEC, Japan

Creation of TRMM PR Data by Minimizing the Effect of the TRMM Orbit Boost
Kaya Kanemaru1, Satoshi Kidå2, Takui Kukoba1, Misakio Kachi1, Riko Oki1, Toshio Iguchi?, Yukari N. Takayabu4
1Earth Observation Research Center, Japan Aerospace Exploration Agency, Japan, 2Toshiba, Japan, 3Applied Electromagnetic Research Institute, National Institute of Information and Communications Technology, Japan, 4Atmosphere and Ocean Research Institute, University of Tokyo, Japan

Overview and Updates of Global Satellite Mapping of Precipitation (GSMaP) for GPM
Misako Kachi (JAXA, Japan)
Kaya Kanemaru (JAXA, Japan)
2015-n-14 (12:00 - 12:20)

Overview of the High Resolution GSMaP Algorithms
Tomoo Ushio1, Tomoaki Mega2, Takuji Kubota2, Misako Kachi2, Kazumasa Aonashi3, Shoichi Shige4
1Osaka University, 2JAXA/EORC, Japan, 3Meteorological Research Institute, 4Kyoto University

2015-n-15 (12:20 - 12:40)

Implementation of the Orographic/Nonorographic Rainfall Classification Scheme with Moist Frouid Number in the GSMaP Algorithm
Munehisa K. Yamamoto, Shoichi Shige
Graduate School of Science, Kyoto University, Japan

2015-n-16 (12:40 - 13:00)

Validation of the Gauge Adjustment GSMaP (GSMaP Gauge)
Tomoaki Mega1, Tomoo Ushio1, Takuji Kubota2, Misako Kachi2, Kazumasa Aonashi3, Soichi Shige4
1Osaka University, Japan, 2JAXA, Japan, 3Meteorological Research Institute, Japan, 4Kyoto University, Japan

2015-n-17 (14:00 - 14:20)

Operation Status of the Dual-Frequency Precipitation Radar on the Global Precipitation Measurement Core Spacecraft
Kinji Furukawa1, Masahiro Kojima1, Toshio Iguchi2, Hiroshi Hanado2, Katsuhiro Nakagawa2, Minoru Okumura3
1JAXA, Japan, 2National Institute of Information and Communications Technology, Japan, 3NEC Space Technologies, Ltd., Japan

2015-n-18 (14:20 - 14:40)

Current Status of GPM/DPR Level 1 Algorithm Development and DPR Calibration
Takeshi Masaki1, Takuki Kubota1, Riko Oki1, Masahiro Kojima1, Kinji Furukawa1, Takeshi Miura1, Toshio Iguchi2, Hiroshi Hanado2, Naofumi Yoshida3, Tomohiko Higashiwato4, Hiroki Kai4
1Japan Aerospace Exploration Agency, Japan, 2National Institute of Information and Communications Technology, Japan, 3Remote Sensing Technology Center of Japan, Japan

2015-n-19 (14:40 - 15:00)

Assumptions in the Rain Retrieval Algorithms for the TRMM Precipitation Radar and the GPM Dual-Frequency Precipitation Radar
Toshio Iguchi1, Shinta Seto2
1National Institute of Information and Communications Technology, Japan, 2Nagasaki University, Japan

2015-n-20 (15:00 - 15:20)

Development of a Routine to Reduce Sidelobe Clutter in GPM/KuPR-L2 Algorithm
Takuki Kubota1, Takeshi Masaki1, Toshio Iguchi2, Shinti Unita2, Naofumi Yoshida2, Hiroshi Hanado2, Riko Oki1
1Japan Aerospace Exploration Agency, Japan, 2National Institute of Information and Communications Technology, Japan, 3Remote Sensing Technology Center of Japan, Japan

2015-n-21 (15:20 - 15:40)

Grand Validation of GPM/DPR by using Phased Array Weather Radar
Yuki Hirano, Tomoaki Mega, Tomoo Ushio
Osaka University, Japan

2015-n-22 (16:00 - 16:20)

[n-5] GCOM-C, EarthCARE & Earth Observations (1)

Session Date July 9 (Thurs) 16:00 – 17:40
Room Kobe International Conference Center, Meeting Room 504
Chairpersons Makoto Kujii (Nara Women's University, Japan)
Masahiro Hori (JAXA, Japan)
# GCOM-C, EarthCARE & Earth Observations (2)

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|                |                                           | Yusaku Ono (JAXA, Japan)      |

## 2015-n-27 ( 9:00 - 9:20 )

### Long-Term Datasets of Satellite-Derived Northern Hemisphere Snow Cover Extent in 5km Spatial Resolution Prepared for JAXA’s GCOM-C Mission

Masahiro Horii1, Konosuke Sugura2, Tomonori Tanikawa2, Teruo Aoki3, Katsuyuki Kuchiki3, Masashi Niwano3, Hiroaki Enomoto4

1JAXA, Japan, 2University of Tsukuba, Japan, 3Meteorological Research Institute, Japan, 4National Institute of Polar Research, Japan, 5SOKENDAI (The Graduate University for Advanced Studies), Japan

## 2015-n-28 ( 9:20 - 9:40 )

### Mapping Surface Solar Irradiance Over Japan and Australia using MTSAT-2 and MODIS

Sylvain Cros1, Matthieu Turpin1, Quentin Verspieren1, Caroline Lallemand1, Nicolas Schmutz1, Guy Pignolet2

1Reuniwatt SAS, Reunion Island, France, 2Reunion Island Space Initiative, Reunion Island, France

## 2015-n-29 ( 9:40 - 10:00 )

### Investigation of the EarthCARE Satellite for Validation Activities

Takuji Kubota, Makiko Hiraoka, Tomoyuki Nomaki, Satoru Fukuda, Riko Oki

Japan Aerospace Exploration Agency, Japan

## 2015-n-30 ( 10:00 - 10:20 )

### The Overview and Status of Vegetation Lidar Mission ‘MOLI’

Junpei Munoka1, Daihaku Sakaiwa1, Takashi Kobayashi2, Keiko Suzuki1, Tadashi Imai1, Toshiyoshi Kimura1, Kazuhiro Asai1,2, Haruo Sawada1,3

1JAXA, Japan, 2Tohoku Institute of Technology, Japan, 3Asian Institute of Technology, Thailand

## 2015-n-31 ( 10:20 - 10:40 )

### Evaluation of a Function Model of Pressurizing Laser Transmitter toward Forest Environment Measurement from Space

Daisuke Sakaiwa1, Junpei Munoka1, Keiko Suzuki2, Tadashi Imai2, Toshiyoshi Kimura1, Kazuhiro Asai1,2

1JAXA, Japan, 2Tohoku Institute of Technology, Japan

### GCOM-W & Ocean Remote Sensing (1)

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### GCOM-W1/AMSR2 Operation and Calibration

**Marehito Kasahara, Norimasa Ito, Keiji Imaoka**  
Japan Aerospace Exploration Agency, Japan

### Overview and Updates of AMSR2 Ocean Products

**Misako Kachi**, **Keiji Imaoka**, **Akira Shibata**  
1JAXA, Japan, 2Japan Meteorological Agency, Japan

### Current Status of the Ansr2 Standard and Research Product for the Land Surface Hydrology

**Hiroyuki Tsutsui**, **Keiji Imaoka**, **Misako Kachi**, **Takashi Maeda**  
Japan Aerospace Exploration Agency (JAXA), Japan

### A New Ocean Suite Retrieval

**David Duncan**, **Chris Kummerow**, **Elena Lobl**  
1Colorado State University, USA, 2University of Alabama in Huntsville, USA

### NOAA GCOM-W1/AMSR2 Oceanic Environmental Products: Validation and User Impacts

**Zorana Jelenak**, **Paul Chang**, **Subeiman Alshehri**, **Jun Park**  
1NOAA/NESDIS/STAR, USA, 2Global Science & Technology Inc., USA, 3University of Maryland, USA

### Development of Daily-Minimum Sea Surface Temperature Data Set Based on Microwave and Visible/Infrared Measurements from Space

**Kohtaro Hosoda**, **Futoki Sakaida**  
Tohoku University, Japan

### Evaluation and Validation of RapidScat Ocean Surface Vector Winds

**Paul S. Chang**, **Zorana Jelenak**, **Seubson Soisuvarn**, **Faozi Sisi**  
1NOAA/NESDIS/STAR, USA, 2Global Science and Technology Inc., USA

### Sea State Monitoring using Reflectometry on TechDemoSat-1

**Alex da Silva Curiel**, **Martin Urwin**, **Martin Sweeting**, **Jason Tye**, **Christine Gommenginger**  
1 Surrey Satellite Technology Ltd., UK, 2 Surrey Space Center, UK, 3 National Oceanographic Center, UK

### Investigation of Interferometric Altimeter Sensor for the Japanese Altimetry Mission, COMPIRA

**Yuki Yajima**, **Akihisa Uematsu**, **Masahiro Nakajima**, **Norimasa Ito**, the JAXA COMPIRA Team  
Japan Aerospace Exploration Agency, Japan

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### GOSAT series & Earth Observations

**Session Date**  
July 10 (Fri) 16:00 – 17:40

**Room**  
Kobe International Conference Center, Meeting Room 504

**Chairpersons**  
Paul S. Chang (NOAA/NESDIS/STAR, USA)  
Kohtaro Hosoda (Tohoku University, Japan)
**Chairpersons**

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<th>Chairpersons</th>
<th>Masataaka Ajiro (National Institute for Environmental Studies, Japan)</th>
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<td>Masakatsu Nakajima (JAXA, Japan)</td>
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### 2015-n-42 (16:00 - 16:20)

**GOSAT-2: Mission, Satellite and Mission Instruments**

Masakatsu Nakajima, Yoshiyuki Ishijima, Hiroshi Suto, Yasutoshi Hyakusoku, Kazuhiko Yotsumoto, Masashi Abe, Takehiro Miyakawa, Kei Shiomi, Takeshi Hirabayashi

JAXA, Japan

### 2015-n-43 (16:20 - 16:40)

**GOSAT TANSO Calibration and Characterization in 6 Years of the On-Orbit Operation**

Shuji Kawakami, Akihiko Kuze, Hiroshi Suto, Kei Shiomi, Masakatsu Nakajima

JAXA, Japan

### 2015-n-44 (16:40 - 17:00)

**Updates on Standard Data Products and Changes on the Observation Locations after 6 Years on Orbit Operation of GOSAT**

Masataaka Ajiro, Fumie Kawaeze, Tatsuya Yokota

National Institute for Environmental Studies (NIES), Japan

### 2015-n-45 (17:00 - 17:20)

**Online Visualization Tool "VISION" on Arctic Data archive System (ADS)**

Takeshi Sugimura, Takeshi Teru, Hirohira Yabuki

1National Institute for Polar Research, Japan, 2Japan Agency for Marine-Earth Science and Technology, Japan

### 2015-n-46 (17:20 - 17:40)

**Compact Infrared Camera (CIRC) for Earth Observation**

Michito Sakai, Haruyoshi Katayama, Eri Kato, Yasuhiro Nakajima, Toshiyoshi Kimura, Koji Nakau

1JAXA, Japan, 2Hokkaido University, Japan

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### 2015-p-01 (15:00 - 15:20)

**Effect of Short-Duration Space Flight on Bone and Body Composition**

Hiroshi Ohshima, Koh Mizuno, Satoshi Furukawa, Chiki Mukai

JAXA, Japan

### 2015-p-02 (15:20 - 15:40)

**Cycling Exercise Interval Training Combined with Electrically Stimulated Antagonist Muscles Improves Oxygen Uptake and Muscle Strength**

Masayuki Omoto, Yoshio Takano, Hiroo Matsusue, Ryuki Hashida, Yuyu Suzuki, Takeshi Nago, Yosihiko Tagawa, Naoto Shibata

1Kurume University Hospital, Japan, 2International University Health and Welfare, Japan, 3Kyushu Institute of Technology, Japan

### 2015-p-03 (15:40 - 16:00)

**Ubiquitin Ligase Cbl-b is a Negative Regulator for Insulin-Like Growth Factor 1 Signaling during Muscle Atrophy Caused by Unloading**

Takayuki Uchida, Takeshi Nikawa, Tomoki Abe, Shotei Hohno, Ayako Ohno, Shigetada Kondo, Katsuya Hirasaka, Yuushi Okumura, Mills M Edward

1University of Tokushima Graduate school, Japan, 2Nagasaki University, Japan, 3Sagami women’s University, Japan, 4University of Texas at Austin, USA

### 2015-p-04 (16:00 - 16:20)

**3-Iodothyronamine-Mediated Metabolic Suppression in Rodent and Muscle Cell: Application to Artificial Hibernation**

Hyunwoo Ju, Hyeok Jung, Kyungbong Ha, Haksup Shin, Chan-Moon Chung, Inho Choi

Yonsei University, Korea

### 2015-p-05 (16:20 - 16:40)

**Overview of JAXA Mouse Habitat Unit Used on Internatioinal Space Station / Kibo**

Akane Yumoto, Dai Shiba, Hiyosyo Mizuno, Atuko Homma, Hiroe Kobayashi, Masaki Shirakawa

Japan Aerospace Exploration Agency, Japan
**[p-2] Space Medicine and Physiology (2)**

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</table>
| Chairpersons       | Nobuyasu Yamaguchi (Osaka University, Japan)  
|                    | Takashi Sugita (Meiji Pharmaceutical University, Japan) |

**2015-p-07 (17:00 - 17:20)**

**Life System Science with Dynamic Material States in Space Activity**
Yasunori Miura  
Yamaguchi University, Japan

**2015-p-08 (17:20 - 17:40)**

**Bacterial Monitoring in the International Space Station-“Kibo” based on rRNA gene sequence**
Nobuyasu Yamaguchi, Tomoaki Ichijo, Masao Nasu  
Graduate School of Pharmaceutical Sciences, Osaka University, Japan

**2015-p-09 (17:40 - 18:00)**

**Space Flight Experiment: Temporal Changes in the Skin Fungal Microbiomes of Astronauts in the International Space Station**
Takashi Sugita1, Takashi Yamazaki2,3, Shin Yamada2, Koichi Makimura2, Otomi Cho1, Hiroshi Oshima1, Noraki Ishioka3, Chiaki Mukai3  
1Meiji Pharmaceutical University, Japan, 2Tokyo University, Japan, 3JAXA, Japan

**2015-p-10 (18:00 - 18:20)**

**Sweet Potato Culture in a Bio-Regenerative Life Support System in Space**
Y. Kitaya, H. Hirai  
Osaka Prefecture University, Japan

**[q-1] Space Power Systems (1)**

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| Chairpersons       | Paul Jaffe (U.S. Naval Research Laboratory, USA)  
|                    | Yoshiyuki Fujino (Toyo University, Japan) |

**2015-q-15 (9:00 - 9:40)**

**Robotic Servicing of Geostationary Satellites: Economic Transformation**
Gordon Roesler  
DARPA, USA

**2015-q-02 (9:40 - 10:00)**

**Possibility of Locating Number of Ultra Large Solar Power Satellite in GEO**
Mitsushige Oda  
Tokyo Tech, Japan

**2015-q-16 (10:00 - 10:30)**

**Shackleton Energy and Off-World Industrialization**
Jim Keravala  
Shackleton Energy Company, USA

**[q-2] Space Power Systems (2)**

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</tbody>
</table>
| Chairpersons       | John Carlton Mankins (Mankins Space Technology, Inc., USA)  
|                    | Mitsushige Oda (Tokyo Institute of Technology, Japan) |

**2015-q-04 (11:00 - 11:20)**

**Microwave Transmission Experiment on the Ground for Future SSPS**
Performance of a "Step" Sandwich Module for Space Solar Power
Paul Jaffe
U.S. Naval Research Laboratory, USA

Experiments of Direction Finding by Pilot Signal for Solar Power Satellite
Shotoaro Katano1, Taishi Kobayashi2, Makoto Tanaka1, Koji Tanaka2
1The University of Takai, Japan, 2The University of Toyo, Japan

Study for Simultaneous Degradation of 2nd and 3rd Harmonics Radiation using a Random Rectenna Array
Yoshiyuki Fujino, Yuusuke Yoshikawa, Yasushi Kobayashi
Toyo University, Japan

Thermal Design and Test of Power Generator/Transmitter Hybrid Panel for Solar Power Satellite
Daisuke Sato1, Noboru Yamada1, Koji Tanaka2
1Nagasaki University of Technology, Japan, 2ISAS/JAXA, Japan

Realizing Commercially-Competitive Space Solar Power: The Path to SPS-ALPHA
John C. Mankins
Mankins Space Technology, Inc., USA

Conceptual Design on the Sandwich Solar Power Satellite II
Nobuyuki Kaya
Kobe University, Japan

Development of Solar Array for HAYABUSA2
Takayuki Ose1, Yukishige Nozaki1, Taichi Hirose2, Naoyuki Kaneko2, Takehiko Ito2, Takanobu Shimada3, Osamu Kawasaki3
1NEC Space Technologies, Ltd., Japan, 2NEC, Japan, 3JAXA, Japan

Modular Electric Power Systems for Spacecraft and Launch Vehicles
Greg Semrau, Dan Muffoletto, Scott Steffan, Chris Pearson
Moog Space & Defense Inc., USA

Major Upgrade of Electrical Power System for High-Powered Micro-Satellite
[r-1] Observation

Session Date: July 7 (Tue) 9:00 – 10:40
Room: Kobe International Conference Center, Meeting Room 505
Chairpersons: Toshiya Hanada (Kyushu University, Japan), Yukihito Kitazawa (IHI Corporation, Japan)

2015-r-01 ( 9:00 - 9:20 )
Detection of LEO Objects using CMOS Sensor
Toshifumi Yanagisawa, Hirohisa Kurosaki, Hiroshi Oda
JAXA, Japan

2015-r-02 ( 9:20 - 9:40 )
Mission Design for NEO Detection and Impact Warning System
Toshinori Itakura1, Alessandro Takeshi Morita Gagliardi2, Hitoshi Ikeda3, Masayoshi Utashima1, Nobuaki Ishi1
1Japan Aerospace Exploration Agency, Japan, 2Ecole Polytechnique, France

2015-r-03 ( 9:40 - 10:00 )
Detection, Photometry and Light Curve of Space Debris in Geosynchronous Earth Orbit
Hiroshi Oda1, Hirohisa Kurosaki1, Toshifumi Yanagisawa1, Makoto Tagawa2
1Japan Aerospace Exploration Agency, Japan, 2Kyushu University, Japan

2015-r-04 ( 10:00 - 10:20 )
Optical Light Curve Observations to Determine Attitude States of Space Debris
T. Schildknecht, J. Silha, E. Linder, M. Hager
University of Bern, Switzerland

2015-r-05 ( 10:20 - 10:40 )
Mission Feasibility of Sensing Attitude Motion of Rocket Body
Toshiya Enomoto, Kenta Shiomi, Ryusuke Harada, Hideaki Hinagawa, Koki Fujita, Toshiya Hanada
Kyushu University, Japan

[r-2] Rotation, In-situ measurement

Session Date: July 7 (Tue) 11:00 – 12:40
Room: Kobe International Conference Center, Meeting Room 505
Chairpersons: Thomas Schildknecht (University of Bern, Switzerland), Toshifumi Yanagisawa (JAXA, Japan)

2015-r-06 ( 11:00 - 11:20 )
Momentum of the Target Received from Projectile in Hypervelocity Impacts
### Modelling

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<tr>
<td>Chairpersons</td>
<td>J.-C. Liou (NASA, USA)</td>
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<td>Oda Hiroshi (JAXA, Japan)</td>
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</tbody>
</table>

#### Small Satellites and the Future Space Debris Environment

**Benjamin Bastida Virgili**¹, **Holger Krag**²

¹IMS Space Consultancy @ ESOC/ESA, Germany, ²ESA Space Debris Office, Germany

#### Dynamic Modeling on Micron-Size Orbital Debris

**Masahiro Furumoto**, **Koki Fujita**, **Toshiya Hanada**

Kyushu University, Japan

#### Impacts of Debris Removal on Future Near-Earth-Orbit Population & Selection of Targets

**Mélissa Zemoura**¹, **Sonali Batra**¹, **Toshiya Hanada**¹, **Satomi Kawamoto**²

¹Kyushu University, Japan, ²JAXA, Japan

#### Effects of Systematic Error on Collision Probability between Space Objects

**Xiaoli Xu**, **Yongqing Xiong**

Chinese Academy of Sciences, China

### Protection

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</table>

#### Development of an Iterative Solution to Aerospace Trajectory Interception Problem

**Ahmed M. Hussein**, **Mohammed K. Ibrahim**, **Mohammed S. Bayoumi**

Cairo University, Egypt
Chairpersons
Yasuhiro Akahoshi (Kyushu Institute of Technology, Japan)
Melissa Zemoura (Kyushu University, Japan)

2015-r-15 (17:00 - 17:20)
Ballistic Limit of Polyethylene Fibre Fabrics Subjected Projectile Impact
Masahiro Nishida1, Ken Mizutani2, Masumi Higashide2
1Nagoya Institute of Technology, Japan, 2JAXA, Japan

2015-r-16 (17:20 - 17:40)
Crater Shape and Ejecta Size Distribution Resulting from Hypervelocity Impact of Spherical Projectiles on LPSO Type Magnesium Alloy
Kaito Ishida1, Masahiro Nishida1, Koichi Hayashi2, Yasuhiro Akahoshi3, Kazuyuki Hokamoto4, Yoshihito Kawamura4
1Nagoya Institute of Technology, Japan, 2National Institute of Technology, Toba College, Japan, 3Kyushu Institute of Technology, Japan, 4Kumamoto University, Japan

2015-r-17 (17:40 - 18:00)
Ejecta Size Distribution due to Projectile Impact on Curved Targets
Yasuyuki Hiraiwa1, Masahiro Nishida1, Kenta Nozaki1, Koichi Hayashi2, Sunao Hasegawa2
1Nagoya Institute of Technology, Japan, 2National Institute of Technology, Toba College, Japan

2015-r-18 (18:00 - 18:20)
Hypervelocity Impact Tests to Assess the Mass and Size Distribution of Spacecraft Ejecta
Yassine Serbouti, Yasuhiro Akahoshi, Koichi Norimatsu, Yousuke Fujimura, Yuuki Fukuda
Kyushu Institute of Technology, Japan

2015-r-19 (18:20 - 18:40)
Damage Estimation of Pressure Wall from Kinetic Energy of Debris Cloud at Oblique Impacts
Yoshihiro Ok1, Kanjiro Makihara1, Sunao Hasegawa2
1Tohoku University, Japan, 2JAXA, Japan

[r-5] Protection, Mitigation, Economics

Session Date
July 8 (Wed) 9:00 – 10:20

Room
Kobe International Conference Center, Meeting Room 505

Chairpersons
Masahiro Nishida (Nagoya Institute of Technology, Japan)
Benjamin Bastida Virgili (ESA, Germany)

2015-r-20 (9:00 - 9:20)
Lessons Learned from Space Debris Vulnerability Analyses in Spacecraft Early Design Phases
Tiziana Cardone1, Tiago Soares1, Andrew Wolahan1, Ivo Ferreira1, Ian Cornell2, Danielle Baker-Wilson2, Benjamin Bastida Virgili3, Holger Krag3
1ESA-ESTEC, The Netherlands, 2ESA-HQ, France, 3ESA-ESOC, Germany

2015-r-21 (9:20 - 9:40)
Prediction of Thermo-Mechanical Behavior of Debris under Oxidative Re-Entry Environment
G. Pinaudi, L. Rhidane
Airbus Defence & Space, France

2015-r-22 (9:40 - 10:00)
MHI’s Space Debris Mitigation Activities and Feasibility Studies for Active Debris Removal Mission
Mitsuya Kadowaki, Shoyo Hyodo, Kotaro Aoki, Takahiro Nakami, Takeshi Uchida
Mitsubishi Heavy Industries, Ltd., Japan

2015-r-23 (10:00 - 10:20)
How the Private Sector Can Realize Sustainable Active Debris Removal - Technologies and Business Model
Nobu Okada, Patrick Loh Shisiong
Astroscale Pte Ltd., Singapore

[r-6] Active Debris Removal (1)

Session Date
July 8 (Wed) 11:00 – 12:40

Room
Kobe International Conference Center, Meeting Room 505
2015-r-25 (11:00 - 11:20)

A Note on Orbital Environment Remediation
Tetsuo Yasaka
QPS Institute, Japan

2015-r-26 (11:20 - 11:40)

A Flight Experiment of Electrodynamic Tether Using HTV toward the Realization of Debris Removal
Satomi Kawamoto, Yasushi Ohkawa, Kentaro Iki, Teppai Okumura, Junichi Aoyama, Yasuhiro Katayama, Daisuke Tsujita, Toru Kasai, Hirohiko Uematsu, Koichi Inoue
JAXA, Japan

2015-r-27 (11:40 - 12:00)

The Expected On-Orbit Tether Deployment Dynamics on KITE Mission
Kentaro Iki, Satomi Kawamoto, Yasushi Ohkawa, Teppai Okumura, Kazutaka Kawashima, Moto Takai, Katsuhiko Iizawa, Koji Matsumoto, Satoshi Suzuki, Yasuhiro Katayama, Yuuta Horikawa, Koichi Inoue
JAXA, Japan

2015-r-28 (12:00 - 12:20)

Dynamics of the Net Systems, Capturing Space Debris
Pavel M. Trivailo¹, Hirohisa Kojima², Jian Shen³, Feng Han³
¹RMIT University, Australia, ²Tokyo Metropolitan University, Japan, ³Beijing Institute of Technology, China

2015-r-29 (12:20 - 12:40)

Evaluation of Harpoon Tips for Debris Capture
Takahiko Mataki¹, Yasuhiro Akahoshi¹, Takao Koura¹, Yukihito Kitazawa², Kazuo Shimamura², Taku Izumiya², Kozue Hashimoto², Satomi Kawamoto³, Jun-ichi Aoyama³, Tadao Fukuta³
¹Kyushu Institute of technology, Japan, ²IHI, Japan, ³JAXA, Japan, ⁴Okayama Prefectural University, Japan

[r-7] Active Debris Removal (2)

Session Date: July 8 (Wed) 15:00 – 16:40
Room: Kobe International Conference Center, Meeting Room 505
Chairpersons: Tetsuo Yasaka (QPS Institute, Japan), Satomi Kawamoto (JAXA, Japan)

2015-r-30 (15:00 - 15:20)

A Scenario for Space Debris Capture by Light Weight Robot Arm
Shin-Ichiro Nishida¹, Naohiko Kikuchi², Shohei Adachi¹, Sou Ito¹, Maroi Kodama¹
¹Tottori University, Japan, ²Komatsu Ltd., Japan

2015-r-31 (15:20 - 15:40)

Experimental Evaluation of Impact Velocity and Tensile Load of Lodging an Ancho on a Satellite Structure for Space Debris Mitigation System
Nguyen Ba Thanh Long¹, Hiroaki Tanaka¹, Hidehiro Hata²
¹National Defense Academy of Japan, Japan, ²Kumamoto University, Japan

2015-r-32 (15:40 - 16:00)

Challenges and Unusual Requirements when Designing a Rendezvous and Docking Technology Demonstrator Mission Target Satellite
Stephan Stoltz, Anja Nicolai, Christian Raschke, Robert Eberwein
Astro- und Feinwerktechnik Adlerhof GmbH, Germany

2015-r-33 (16:00 - 16:20)

Conceptual Study of Mechanical and Sensing System for Debris Capturing for PAF
Nobuyuki Kubota¹, Masayuki Enomoto¹, Kouichi Shibasaki¹, Satomi Kawamoto², Yasuhiro Ohkawa², Junichi Aoyama², Yasuhiro Katayama²
¹Kawasaki Heavy Industries, Ltd., Japan, ²Japan Aerospace Exploration Agency, Japan

2015-r-34 (16:20 - 16:40)

Modeling of the Behavior of Magnetic Particles inside a Robotic Gripper System for Active Space Debris Removal
Ayano Kido, Hirohisa Kojima
Tokyo Metropolitan University, Japan
### [r-8] Active Debris Removal (3)

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<td>Shin-Ichiro Nishida (Tottori University, Japan)</td>
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<td>Ian Carnelli (European Space Agency, France)</td>
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**2015-r-35 (17:00 – 17:20)**

**De-Orbit Kit Technology for Space Debris Mitigation**
Sourabh Kaushal, Nishant Arora, Kellen McNally, J. P. Coadou
1. Institute of Science & Technology KIowa, India
2. Nova Shell Materials Technologies, Canada

**2015-r-36 (17:20 – 17:40)**

**A Long Term Space Debris Mitigation Approach Based on an Independent Decommissioning Device for Satellite and Launcher Space**
Stefano Antonetti, Lorenzo Ferrario, Luca Rossetti
D-Orbit Srl, Italy

**2015-r-37 (17:40 – 18:00)**

**Robotic Remanufacturing and Transport System for Space Debris Mitigation**
Rahul Soni
Babu Banarasi Das National Institute of Technology and Management, India

**2015-r-39 (18:00 – 18:20)**

**The Dynamics Analysis of Capturing a Non-Cooperative Satellite with the Multi-Joint Holding System**
Daiki Hamashima, Akihiko Honda, Hiroki Nakanishi, Mitsushige Oda
Tokyo Institute of Technology, Japan

**2015-r-40 (18:20 – 18:40)**

**Optical Phase Conjugation for Small Space Debris Removal**
Kotomi Kawakami, Shigeki Uchida, Hideki Okamuro, Kimiya Komurasaki
1. The University of Tokyo, Japan
2. The Graduate School for the Creation of New Photonics Industries, Japan
3. International Christian University, Japan

### [r-9] Space Environment

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<td>Kiyokazu Koga (JAXA, Japan)</td>
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<td>Kazuhiro Toyoda (Kyushu Institute of Technology, Japan)</td>
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**2015-r-42 (9:00 – 9:20)**

**Orbit Determination of Meteoroids by MU Radar Meteor Head Echo Observations**
Shinsuke Abe, Johan Kero, Daniel Kastinen, Takui Nakamura, Yasunori Fujiwara, Souichirou Numata, Junichi Watanabe, Hiroyuki Hashiguchi, MURMHED members
1. Department of Aerospace Engineering, Nihon University, Japan
2. Swedish Institute of Space Physics, Sweden
3. University of Technology, Sweden
4. National Institute of Polar Research, Japan
5. National Astronomical Observatory of Japan, Japan
6. Kyoto University, Japan

**2015-r-43 (9:20 – 9:40)**

**The Measurement of the Heavy Ions Telescope in Kibo Exposed Facility on the ISS**
Haruka Ueno, Haruhisa Matsumoto, Kiyokazu Koga, Aiko Nagamatsu
JAXA, Japan

**2015-r-44 (9:40 – 10:00)**

**Radiation Measurement by Light Particle Telescope on JASON-2/-3**
Osamu Okudaira, Haruhisa Matsumoto
JAXA, Japan

**2015-r-45 (10:00 – 10:20)**

**The Precipitation of Energetic Electrons Observed at the Altitude of 666km Association with the Phenomenon before the Great 3.11 Earthquake**
Kyohei Ohno, Rei Mitsuhashi, Nobuyuki Hasebe, Koh-Ichiro Oyama, Tetsuya Kodama, Haruhisa Matsumoto, Osamu Okudaira
1. Waseda University, Japan
2. Kyushu University, Japan
3. JAXA, Japan

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## [r-10] On orbit investigations

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<tr>
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<td>Masao Nakamura (Osaka Prefecture University, Japan)</td>
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<td>Haruka Ueno (JAXA, Japan)</td>
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### 2015-r-46 (11:00 - 11:20)

**Development of Low Cost Double Probe Plasma Measurement System for a Lean Satellite HORYU-IV**

Taiwo Tejumola, Atsushi Tanaka, Arifur Khan, HORYU-4 Project Team, Mengu Cho  
Kyushu Institute of Technology, Japan.

### 2015-r-47 (11:20 - 11:40)

**Development of Arc Experiment System for Nano-Satellite "Horyu-4"**

Hiroshi Fukuda, Tatsuo Shimizu, Kazuhiro Toyoda, Mengu Cho  
Kyushu Institute of Technology, Japan

### 2015-r-48 (11:40 - 12:00)

**Universal Scaling Laws for Fully-Developed Magnetic Field Turbulence Near and Far Upstream of the Earth’s Bow Shock**

Rodrigo A. Miranda¹, Abraham C.-L. Chian²,³,⁴, Erico L. Rempel²,³  
¹University of Brasilia (UnB), Brazil, ²Institute of Aeronautical Technology (ITA), Brazil, ³National Institute for Space Research (INPE), Brazil, ⁴University of Adelaide, Australia

### 2015-r-49 (12:00 - 12:20)

**Measurement Result of Solar Neutrons Onboard the Space Environment Data Acquisition Equipment – Attached Payload (SEDA-AP)**

Kiyokazu Koga¹, Yasushi Muraki³, Shoichi Shibata², Haruhsia Matsumoto¹, Osamu Okudaira¹, Hideaki Kawasaki³, Kiyohumi Yumoto⁴  
¹JAXA, Japan, ²Chubu University, Japan, ³Nagoya University, Japan, ⁴Kyushu University, Japan

## [r-11] On orbit investigations, Materials characterization

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<td>Kiyokazu Koga (JAXA, Japan)</td>
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### 2015-r-51 (14:00 - 14:20)

**Photoelectron Current Measurement on Nano-Satellite in Low Earth Orbit**

Ewang Essien, Kazuhiro Toyoda, Mengu Cho  
Kyushu Institute of Technology, Japan

### 2015-r-52 (14:20 - 14:40)

**Measurement of Total Electron Emission Yield with Different Temperatures**

Akira Miyahara¹, Kazutaka Kawasaki¹, Jiang Wu², Kazuhiro Toyoda¹, Mengu Cho¹  
¹Kyushu Institute of Technology, Japan, ²Xi'an Jiaotong University, China

### 2015-r-53 (14:40 - 15:00)

**Effect of Electron Dose Rate on Volume Resistivity of Polyimide Film under Electron Irradiation**

Rikio Watanabe¹, Masanichih Ohira², Teppei Okumura², Masato Takahashi²  
¹Tokyo City University, Japan, ²JAXA, Japan

### 2015-r-54 (15:00 - 15:20)

**Hyperthermal Carbon Dioxide Beam Formation for Gas-Surface Interaction Studies in Upper Martian Atmosphere**

Akime Hatuda, Kumiko Yokota, Masahito Tagawa  
Kobe University, Japan

### 2015-r-55 (15:20 - 15:40)

**Synergistic Effect of Atomic Oxygen and Ar on Polyimide Erosion in Sub-Low Earth Orbit**

Yuki Yamashita, Kenta Ide, Kumiko Yokota, Masahito Tagawa  
Kobe University, Japan
### Session Date
July 9 (Thurs) 16:00 – 18:00

### Room
Kobe International Conference Center, Meeting Room 505

### Chairpersons
Miyake Hiroaki (Tokyo City University, Japan)
Haruka Ueno (JAXA, Japan)

### 2015-r-56 (16:00 - 16:20)
**A Statistical Analysis of the Worst GEO Plasma Environment and Spacecraft Potential**
Masao Nakamura, Mitsunobu Oda, Shinya Nakamura
Osaka Prefecture University, Japan

### 2015-r-57 (16:20 - 16:40)
**Measurement of Distribution of Electron Emission from Passive Electron-Emitting Film for Mitigation of Spacecraft Charging in Plasma**
Yumiko Okada, Atsumu Tanaka, Anfur Khan, Minoru Iwata, Kazuhiro Toyoda, Mengu Cho
Kyusyu Institute of Technology, Japan

### 2015-r-58 (16:40 - 17:00)
**Mechanical Property Change by Deuterium Lamp**
Sho Ito, Minoru Iwata, Mengu Cho
Kyusyu Institute of Technology, Japan

### 2015-r-59 (17:00 - 17:20)
**Charging and Discharging of Internal Electronics in LEO Nano-Satellites**
S. Chen
Kyushu Institute of Technology, Japan

### 2015-r-60 (17:20 - 17:40)
**Modeling of Flashover Current on Solar Array**
Anna Kawano
Kyushu Institute of Technology, Japan

### 2015-r-61 (17:40 - 18:00)
**Research on Relationship between Polyimide Film Thickness and Sustained Arc Mitigation on Solar Array**
Yuuki Asari
Kyushu Institute of Technology, Japan

### Session Date
July 10 (Fri) 9:00 – 10:20

### Room
Kobe International Conference Center, Meeting Room 505

### Chairpersons
Kazuhiro Toyoda (Kyushu Institute of Technology, Japan)
Masao Nakamura (Osaka Prefecture University, Japan)

### 2015-r-62 (9:00 - 9:20)
**Devised the Physical Model of the Secondary Electron Emission Yield Based on the Experiment**
Hiroaki Taniguchi
Tokyo City University, Japan

### 2015-r-63 (9:20 - 9:40)
**Dependence of Internal Charge Accumulation Characteristic on Fluoride Material with and without Al Layer Irradiated by an Electron under Dc Stress**
Takuma Mori
Tokyo City University, Japan

### 2015-r-64 (9:40 - 10:00)
**Measurement of Total Electron Emission Yield and Photo-Electron Emission Yield for Aged Space Materials**
Kazutaka Kawasaki
Kyushu Institute of Technology, Japan

### 2015-r-65 (10:00 - 10:20)
**Spacecraft Potential Estimation in Worst Case Environment**
Kazuhiro Toyoda
[I-1] Value / Knowledge Creation and Thermal System

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<td>Shusaku Yamaura (Keio University, Japan)</td>
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<td>Seiko Shirasaka (Keio University, Japan)</td>
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**2015-t-01 (16:00 - 16:20)**

Discovering Knowledge of Voyage Pattern from AIS Trajectories
Po-Ruey Lei
ROC Naval Academy, Taiwan

**2015-t-02 (16:20 - 16:40)**

A Knowledge Management Framework by Modeling Knowledge Use Case Focusing on Systems Engineering Activities
Tran Manh Hung, Shusaku Yamaura, Makoto Ioki, Seiko Shirasaka
Keio University, Japan

**2015-t-03 (16:40 - 17:00)**

D-Case Templates for Applying SQuaRE to Thermal Design Process of Microsatellite
Nguyen Huu Diep¹, Shusaku Yamaura¹, Makoto Ioki¹, Seiko Shirasaka¹, Shinichi Nakasuka²
¹Keio University, Japan, ²The University of Tokyo, Japan

**2015-t-08 (17:00 - 17:20)**

A Method to Clarify Relation between Safety Information Described in Different Documents
Nasa Yoshioka, Seiko Shirasaka
Keio University, Japan

[I-2] Systems Approach to management and itilities

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<td>Makoto Ioki (Keio University, Japan)</td>
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<td>Yohsuke Nambu (Osaka Prefecture University, Japan)</td>
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**2015-t-05 (9:00 - 9:20)**

Designing the International Framework for Active Debris Removal Operation
Akiko Otsuka¹, Daisuke Tojita², Satomi Kawamoto³, Daisuke Goto³, Naohiko Kohtake¹, Seiko Shirasaka¹, Yoshiaki Ohkami¹
¹Keio University, Japan, ²JAXA, Japan

**2015-t-06 (9:20 - 9:40)**

Risk Management Process Framework to Capture Project Contexts and Decision Making Strategies
Nguyen Dinh Chau Minh, Shusaku Yamaura, Makoto Ioki, Seiko Shirasaka
Keio University, Japan

**2015-t-07 (9:40 - 10:00)**

Implementation and Evaluation of Reasonably Reliable Systems Engineering for Micro-Satellites through Hodoyoshi-3 and -4 Projects
Seiko Shirasaka¹, Yoshinori Tsuruda², Shinichi Nakasuka², Masayasu Matsui³, Ichiro Mase³
¹Keio University, Japan, ²The University of Tokyo, Japan, ³The Next generation Space system Technology Research Association, Japan

**2015-t-09 (10:00 - 10:20)**

Crater Detection Method using Principle Component Analysis and Its Evaluation
Tatsuya Takino¹, Izuru Nomura¹, Junya Irie¹, Shin Nagata¹, Hiroyuki Kamata², Keiki Takadama³, Seisuke Fukuda⁴, Shujiro Sawar⁴, Shin-ichiro Sakai⁴
¹Graduate School of Science and Technology, Meij University, Japan, ²School of Science and Technology, Meij University, Japan, ³The University of Electro-Communications, Japan, ⁴ISAS, JAXA, Japan

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## Control and Dynamic System

### Session Date
July 10 (Fri) 11:00 – 12:20

### Room
Kobe International Conference Center, Meeting Room 401

### Chairpersons
Makoto Ioki (Keio University, Japan)
Seiko Shirasaka (Keio University, Japan)

#### 2015-t-10 (11:00 - 11:20)

Jayranon Plaidoung, Unchayinee Khowsuwan, Saithip Limtrakul

1. Geo-Informatics and Space Technology Development Agency (GISTDA), Thailand
2. Khonkaen University, Thailand

#### 2015-t-12 (11:20 - 11:40)
**A Mars Positioning System using Sun Tracking and Outline Extraction Nature Satellite**

Chiharu Niwa, Kouji Numomura, Kentarou Suda, Nobuto Hirakoso

1. Gunma National College of Technology, Japan
2. Yokohama National University, Japan

#### 2015-t-13 (11:40 - 12:00)
**Space Disposal of Nuclear Waste : Examination of Earth-Moon L4/L5 Orbit Insertion**

Hyungjin Kim, Chul Park

Korea Advanced Institute of Science and Technology, Korea

#### 2015-t-14 (12:00 - 12:20)
**Adjusting SLIM Spacecraft Location Estimation to Crater Detection for High Precision and Computational Time Reduction**

Kotaro Usui, Tomohiro Harada, Keiki Takadama, Hironuki Kamata, Seisuke Fukuda, Shujiro Sawai, Shinichiro Sakai

1. The University of Electro-Communications, Japan
2. Meiji University, Japan
3. Japan Aerospace Exploration Agency (JAXA), Japan

## System Concept Development and SE Education

### Session Date
July 10 (Fri) 14:00 – 15:40

### Room
Kobe International Conference Center, Meeting Room 401

### Chairperson
Seiko Shirasaka (Keio University, Japan)

#### 2015-t-19 (14:00 - 14:20)
**Lessons Learned in Student CanSat Development Contest Envisioning Future Engineering Systems**

Hiraku Sakamoto, Yuya Nakamura

1. Tokyo Institute of Technology, Japan
2. Axelspace Corporation, Japan

#### 2015-t-16 (14:20 - 14:40)
**Systematization of Satellite Concept Design and the Supporting Tool**

Shusaku Yamaura, Seiko Shirasaka, Makoto Ioki

Keio University, Japan

#### 2015-t-17 (14:40 - 15:00)
**Study on Requirements Analysis and Management of Nano-Satellites with Open Modelbased Collaboration Tool**

Yohsuke Nambu, Masashi Miura, Ryosuke Yoshizawa, Toshirihige Haghfar, Shunsuke Kimura, Akira Yumiyama, Satoru Igarashi

1. Osaka Prefecture University, Japan
2. Tottori University, Japan
3. University of Tokyo, Japan
4. BALUS Develops, Japan

#### 2015-t-18 (15:00 - 15:20)
**Experiences on Training Systems Engineers for Space Life Sciences Projects**

Mohammad Ebrahimi

Iranian Space Research Center, IRAN

#### 2015-t-15 (15:20 - 15:40)
**Concept Engineering Method Applying to Satellite System Design**

Makoto Ioki, Seiko Shirasaka

Keio University, Japan

## Communication and Power System
### Session Date
July 10 (Fri) 16:00 – 17:20

### Room
Kobe International Conference Center, Meeting Room 401

### Chairpersons
- Shusaku Yamaura (Keio University, Japan)
- Yohsuke Nambu (Osaka Prefecture University, Japan)

#### 2015-t-20 (16:00 - 16:20)

**Methods and Results of Laser Communication Experiment aboard the ISS Russian Segment**

Igor V. Sorokin\(^1\), Vladimir N. Grigoriev\(^2\), Oleg A. Ivlev\(^2\), Victor V. Sumerin\(^2\), Victor D. Shargorodsky\(^2\)

\(^1\)S.P. Korolev Rocket and Space Corporation "Energia", Russia; \(^2\)Science and Production Public Joint-Stock Company "Systems of Precision Instrument Making", Russia

#### 2015-t-21 (16:20 - 16:40)

**Study on Beam Switched Telemetry Communication Antenna for Small-Scale Unmanned Supersonic Airplane**

Shoichi Kitazawa\(^1\), Masazumi Ueba\(^2\)

\(^1\)ATR Wave Engineering Laboratories, Japan; \(^2\)Muroran Institute of Technology, Japan

#### 2015-t-22 (16:40 - 17:00)

**Laser Communication between Micro Satellites and GEO Satellites**

Do Phong, Shinichiro Haruyama

Keio University, Japan

#### 2015-t-23 (17:00 - 17:20)

**Power Peak Curbing Switching Schedule in Multi-Agent System with Power Resource Constraint**

Sho Ohtani\(^1\), Osamu Moro\(^2\), Yoji Shirasawa\(^2\), Jun'ichiro Kawaguchi\(^2\)

\(^1\)The University of Tokyo, Japan; \(^2\)JAXA, Japan

---

### Session Date
July 10 (Fri) 11:00 – 12:30

### Room
Kobe International Conference Center, Meeting Room 404

### Chairpersons
- Misuzu Onuki (Space Frontier Foundation, Asia)
- Hironori Sahara (Tokyo Metropolitan University, Japan)

#### 2015-u-01 (11:00 - 11:15)

**Space as Pedagogy for Cross-Curricular Teaching**

Toshiaki Takemae\(^2\), Makito Yurita\(^2\)

\(^1\)JAXA, Japan; \(^2\)Shimane University, Japan

#### 2015-u-02 (11:15 - 11:30)

**Consideration on How to Encourage and Penetrate Space Education into Elementary and Secondary Education**

Kaori Sasaki

JAXA, Japan

#### 2015-u-03 (11:30 - 11:45)

**The Outreach Activity about Space Development using Free Magazine**

Ayano Kido\(^1\), Kohei Tanaka\(^2\), Shinichiro Kawaguchi\(^2\), Masahiro Kanasaki\(^1\)

\(^1\)Tokyo Metropolitan University, Japan; \(^2\)The Graduate University for Advanced Studies, Japan; \(^3\)Kobe University, Japan

#### 2015-u-04 (11:45 - 12:00)

**Application for an Engineering Design Education of Lunar/Planetary Exploration**

Kentarou Kitamura\(^1\), Sei-ichiro Miura\(^1\), Junichi Haruyama\(^2\)

\(^1\)Tokuyoama College, Japan; \(^2\)ISAS/JAXA, Japan

#### 2015-u-05 (12:00 - 12:15)

**Key concepts of ITF-1 & ITF-2 toward Space Education and Outreach for the Benefit of All People**

Atsushi Yasuda, Hiroki Kameda, Toshihiro Kameda

University of Tsukuba, Japan

#### 2015-u-06 (12:15 - 12:30)

**Ten Years of the Tanegashima Rocket Contest for Development of Young Generation in Space Engineering**

Shigeru Aso, Hiroshi Hirayama, Kazuhiko Morishita

Kyuushu University, Japan
[u-2] Space Tourism and Culture

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| Chairpersons       | Toshiaki Takemae (JAXA, Japan)  
|                    | Hiroaki Isobe (Kyoto University, Japan) |

2015-u-07 (14:00 - 14:20)
SpaceShip2 Will Change Private Space Industry in Japan
Takahito Sakaue, Harufumi Tamazawa, Akito O. Kawamura, Fujo Nakano
Kyoto University, Japan

2015-u-08 (14:20 - 14:40)
Reflections on the Public Understanding and Social Implementation of Space Flight
Roland Antonius Gabrielli¹, Georg Hendrich¹, René Lauffer²
¹Stuttgart University, Germany, ²Baylor University, USA

2015-u-09 (14:40 - 15:00)
Fashion & Textile for Augmenting Human in Space
Takuya Nogima¹, Miki Yamamura², Junichi Kaneko³, Lisako Ishigami⁴, Hiroko Uchiyama⁴, Naoko Yamazaki⁵,⁶
¹University of Electro-Communications, Japan, ²Joshibi University of Art and Design, Japan, ³Motonobu, Japan

2015-u-10 (15:00 - 15:20)
Developing Zero Gravity Tourism in Reunion Island
Willy Lameyer, Guy Pignot
Reunion Island Space Initiative, Reunion

2015-u-11 (15:20 - 15:40)
Development and Technical Demonstration of the Tutorial that Take Advantage of the Result of "Hayabusa" Missions
Akihiko Ito¹, Masanori Okada¹, Hirohide Mabuchi¹, Jun Miyamoto¹, Tatsuki Shimabukuro¹, Mina Sakai¹, Manabu Ide², Tsuyoshi Fujimura², Naoyuki Ohira², Yukihiro Nakatake³, Mika Matsuo⁴, Mitsuhiro Tsuchiya⁴
¹Space Engineering Development Co., Ltd., Japan, ²Kagoshima City Foundation for Education and Culture Promotion, Japan, ³Congress Corporation, Japan, ⁴JAXA, Japan

[u-3] Capacity Building

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| Chairpersons       | Hiroshi Hirayama (Kyushu University, Japan)  
|                    | Rei Kawashima (UNISEC-Global, Japan) |

2015-u-12 (16:00 - 16:20)
Introduction to UNISEC-Global – Background, Status-Quo and Future Perspectives –
Rei Kawashima
University Space Engineering Consortium (UNISEC), Japan

2015-u-13 (16:20 - 16:40)
Space Education at UNISEC-TR (UTEB) Universities
A. Rüstem Aslan¹, Abdurrahman Hacoglu², Mansur Celebi², Emrah Kalemci³, Ömer Soykasap⁴
¹Istanbul Technical University, Turkey, ²Ankara Academy, Turkey, ³Sabanci University, Turkey, ⁴Florida State University, Turkey

2015-u-14 (16:40 - 17:00)
UbatubaSat – A Roadmap from Public Brazilian Schools Towards Knowledge
Cândido O. de Moura¹, Auro Tikami², Walter A. Dos Santos²
¹Escola Municipal Prof. Tancredo de Almeida Naves, Brazil, ²INPE, Brazil

2015-u-15 (17:00 - 17:20)
Creating and Maintaining of a Workshop for Graduate Course in Engineering and Space Technology and its Usefulness to the Training of Future Researchers
Irineu dos Santos Yassuda¹, Mônica Elizabeth Rocha de Oliveira², Igor Mainent Leal Lopes², Marcelo Henrique Essado de Morais², Suely Mitsuko Hirakawa Gondo², Eloy Martins Oliveira Junior², Christopher Shneider Cerqueira², Maria do Carmo Nonato², Cândido O. de Moura³
¹Escola Municipal Prof. Tancredo de Almeida Naves, Brazil, ²INPE, Brazil, ³JAXA, Japan
2015-u-16 (17:20 - 17:40)
Challenges for Space Activities in Angola
Zolana Rui Joao
Gabinete de Gestão do Programa Espacial Nacional (GGPEN) (Angolan National office for space affairs), Angola

[v-1] International Law, Policy and Cooperation in Space Utilization (1)

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<td>Chairpersons</td>
<td>Motoko Uchitomi (JAXA, Japan)</td>
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<td>Yasuaki Hashimoto (The National Institute for Defense Studies, Japan)</td>
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2015-v-01 (9:00 - 9:15)
The Amended IAF Constitution: Keeping up with the Changing Space Community
Kosuke Kawashima1, Masami Onoda1, Lesley Jane Smith2
1Japan Aerospace Exploration Agency, Japan, 2Leuphana University Lüneburg, Law School, Germany

2015-v-02 (9:15 - 9:30)
Classification of Countries Worldwide according to Satellite Activity Level
John Polansky, Mengu Cho
Kyushu Institute of Technology, Japan

2015-v-03 (9:30 - 9:45)
Legal Issues in Preventing Harmful Interference to Satellite Communications
Yuri Takaya
Kobe University, Japan

2015-v-04 (9:45 - 10:00)
Development of a Planetary Protection Laboratory for Mars Missions
T. Ozawa1, K. Fujita1, Y. Shimizu1, A. Yamagishi2, T. Satoh1
1JAXA, Japan, 2Tokyo University of Pharmacy and Life Sciences, Japan

[v-2] International Law, Policy and Cooperation in Space Utilization (2)

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<tr>
<td>Chairpersons</td>
<td>Hiroshi Yoshida (Excalibur KK, Japan)</td>
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<td>Yasuaki Hashimoto (The National Institute for Defense Studies, Japan)</td>
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2015-v-08 (11:00 - 11:15)
U.S.-Japan Cooperation for Space Security
Yuichiro Nagai
The University of Tokyo, Japan

2015-v-09 (11:15 - 11:30)
International RSS Data Policy from the Perspectives of Privacy and Data Flow
Kanaho Imaoka
2015-w-10 (11:30 - 11:45)

On the Ability of Maneuverable Re-Entry Vehicle to Pursue Moving Target

Hao-Chi Chang1, Yen-Sen Chen1, Feng-Tai Hwang1, Tzu-Yun Su2

1National Chiao Tung University, Taiwan, 2Tamkang University, Taiwan

2015-w-11 (11:45 - 12:00)

Evolution of Technology Proliferation for High/Medium Resolution Remote Sensing Satellites and Export Control

Feng-Tai Hwang, Shih-Chieh Chou

National Space Organization (NSPO), Taiwan

2015-w-12 (12:00 - 12:15)

The International Cooperation through Space Activities for More Stable Situation in Asian Region

Yasuaki Hashimoto

The National Institute for Defense Studies, Japan

2015-w-08 (9:00 - 9:20)

The Fatigue Damage Detection System Based on Wave Propagation Method

Adam Stawiarski, Aleksander Muc, Marek Barski

Cracow University of Technology, Poland

2015-w-02 (9:20 - 9:40)

ESA/NASA/JAXA Trilateral Efforts for Mutual Recognition of S&MA Standards

Tetsuya Nakano1, Masami Mitsui1, Roberto Ciaschi2, Rafael Prades2, Frank Groen3

1JAXA, Japan, 2ESA-ESTEC, The Netherlands, 3NASA, USA

2015-w-03 (9:40 - 10:00)

Expansion of JAXA Software IV&V Techniques to Private Companies

Keita Sakemi, Nobuyuki Hoshino, Michihiro Matsumoto

Japan Manned Space Systems Corporation, Japan

2015-w-04 (10:00 - 10:20)

Approach to Elimination of Connector Failures by Using PSF Method

Kumi Shimada1, Tsuyoshi Nakagawa2, Kunio Aimono2, Hiroshi Nomoto1

1High-Reliability Engineering & Components Corporation, Japan, 2JAXA, Japan

2015-w-05 (10:20 - 10:40)

The Importance of Temperature Control in the Ground Test of Ultraviolet Degradation

Kazuyuki Mori, Kazunori Shimazaki

JAXA, Japan

[w-2] Safety and Mission Assurance (2)

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<td>Room</td>
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<tr>
<td>Chairpersons</td>
<td>Koichi Suzuki (JAXA, Japan)</td>
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</table>

2015-w-07 (11:20 - 11:40)

Safety Assessment for Small Secondary Payloads Launched by Japanese Launch Vehicle

Takashi Goto1, Masami Miki1, Koji Oga1, Kouki Saiga2, Teruhiko Tabuchi2

1High-Reliability Engineering & Components Corporation, Japan, 2JAXA, Japan
[w-3] Safety and Mission Assurance (3)

Session Date: July 10 (Fri) 14:00 – 15:40
Room: Kobe International Conference Center, Meeting Room 503
Chairpersons: Satoshi Kikuchi (HIREC, Japan), Ryoji Kobayashi (JAXA, Japan)

2015-w-11 (14:00 - 14:20)
Fabrication and Characterization of QCM Array Sensor for Evaluation of Contamination In-Plane Distribution
Yuta Tsuchiya, Osamu Uchida, Ichiro Kato, Yuka Miura, Eiji Miyazaki, Koichi Suzuki
JAXA, Japan

2015-w-12 (14:20 - 14:40)
Development of Space-Quualified Photocurable Silsesquioxane-Coated Polyimide Films
Yugo Kimoto1, Junichiro Ishizawa1, Koichi Suzuki1, Takeshi Fujita2, Naomasa Furuta2, Akimori Kitamura2, Hiroshi Suzuki2
1JAXA, Japan, 2Toagosei Co., Ltd., Japan

2015-w-13 (14:40 - 15:00)
Promotion of Mutual Use of Space Qualified Parts in Japan and Europe -Evaluation of European Relay in Japan-
Naomi Ikeda1, Tadahiro Machida2, Tatsuya Nakano2, Shuji Yamamoto2, Norio Nemoto1, Koichi Suzuki1
1JAXA, Japan, 2Mitsubishi Precision Co., Ltd., Japan

2015-w-14 (15:00 - 15:20)
Evaluation of Radiation Hardened Logic Circuit Elements to Realize Nanometer-Scale CMOS LSIs for Space Applications
Keita Sakamoto, Akiimitsu Manu, Tsukasa Ebihara, Hiroyuki Shindou, Satoshi Kuboyama, Koichi Suzuki
Japan Aerospace Exploration Agency, Japan

2015-w-15 (15:20 - 15:40)
Study on High-Density Surface Mount Technology in JAXA
Noriko Yamada, Toshiyuki Yamada, Koichi Shinozaki
JAXA, Japan

Finalist Student Session

[s-1] Finalist Student Session (1)

Session Date: July 9 (Thurs) 9:00 – 10:40
Room: Kobe International Conference Center, Meeting Room 404
Chairpersons: Makoto Matsui (Shizuoka University, Japan), Tony Schoenherr (The University of Tokyo, Japan)
2015-s-01-a (9:00 - 9:20)

Spray and Flame Structures in Ethanol/Liquid Oxygen Rocket Engine with a Planar Pintle Injector
Kazuki Sakaki
The University of Tokyo, Japan

2015-s-02-b (9:20 - 9:40)

Reduction of the Guard Erosion in a 2 Kw Anode Layer Hall Thruster
Yuya Hirano
The University of Tokyo, Japan

2015-s-03-b (9:40 - 10:00)

Numerical Simulation of a Freestream MHD Generator System using the MHD Equations
Robin L. Karlsson
The University of Tokyo, Japan

2015-s-04-b (10:00 - 10:20)

Measurement of Aluminum Erosion Rate by Cavity Ring-Down Spectroscopy
Atsushi Yamaguchi
Kyushu University, Japan

2015-s-05-c (10:20 - 10:40)

Fundamental Research of Shape Control of CFRP Reflector
Shun Tanaka
Nagoya University, Japan

2015-s-06-d (11:00 - 11:20)

Nonholonomic Behaviour of Biased-Momentum Asymmetric Spacecraft in Sun-Tracking Motion Using Solar Radiation Pressure
Kosuke Akatsuka
The University of Tokyo, Japan

2015-s-07-d (11:20 - 11:40)

Stabilization Strategy of Delta-V Assisted Periodic Orbits around Asteroids Based on an Augmented Monodromy Matrix
Shota Kikuchi
The University of Tokyo, Japan

2015-s-08-e (11:40 - 12:00)

Numerical and Experimental Investigation on Interaction between Flow around a Hypersonic Body and Supersonic Jet from its Tail
Mohammad Samara
The University of Tokyo, Japan

2015-s-09-f (12:00 - 12:20)

Development of Reaction Wheels for Cubesats Using a Solid Lubricant Bearing
Shinya Fujita
Tohoku University, Japan

2015-s-10-f (12:20 - 12:40)

Optimal Asteroid Fly-by Trajectory Guidance Strategy using Optical Navigation Considering Trade-Off between Risk and Fuel Consumption
Shintaro Nakajima
The University of Tokyo, Japan

[s-2] Finalist Student Session (2)

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Kota Fukuda (Tokai University, Japan) |

2015-s-06-d (11:00 - 11:20)

Nonholonomic Behaviour of Biased-Momentum Asymmetric Spacecraft in Sun-Tracking Motion Using Solar Radiation Pressure
Kosuke Akatsuka
The University of Tokyo, Japan

2015-s-07-d (11:20 - 11:40)

Stabilization Strategy of Delta-V Assisted Periodic Orbits around Asteroids Based on an Augmented Monodromy Matrix
Shota Kikuchi
The University of Tokyo, Japan

2015-s-08-e (11:40 - 12:00)

Numerical and Experimental Investigation on Interaction between Flow around a Hypersonic Body and Supersonic Jet from its Tail
Mohammad Samara
The University of Tokyo, Japan

2015-s-09-f (12:00 - 12:20)

Development of Reaction Wheels for Cubesats Using a Solid Lubricant Bearing
Shinya Fujita
Tohoku University, Japan

2015-s-10-f (12:20 - 12:40)

Optimal Asteroid Fly-by Trajectory Guidance Strategy using Optical Navigation Considering Trade-Off between Risk and Fuel Consumption
Shintaro Nakajima
The University of Tokyo, Japan

[s-3] Finalist Student Session (3)

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Kota Fukuda (Tokai University, Japan) |
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<th>Institution</th>
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<td>Conceptual Study on Vertical Take-Off and Landing TSTO</td>
<td>Akihisa Takeda</td>
<td>The University of Tokyo, Japan</td>
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<td>2015-s-12-j</td>
<td>Analysis of Rainfall Spatial Correlation Characteristics for Rain Attenuation Mitigation Using Radar Data</td>
<td>Yushi Inose</td>
<td>Tokyo Metropolitan University, Japan</td>
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<td>2015-s-13-k</td>
<td>Development of a High Sensitive Gas Measuring Instrument for Martian Methane Measurement</td>
<td>Yusuke Kindaichi</td>
<td>The University of Tokyo, Japan</td>
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<td>2015-s-14-p</td>
<td>Comparison How Different Azuki Bean Experiments Results between on Ground and in Space, Cooperate with SSF2013</td>
<td>Tanapoom Jamphon</td>
<td>Panyarat High School, Thailand, NSTDA, Thailand, JAXA, Japan</td>
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<tr>
<td>2015-s-15-q</td>
<td>Development of an Electrical Generating System by Tether for Debris Removal</td>
<td>Shiro Yasunaga</td>
<td>Kyushu Institute of Technology, Japan</td>
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<td>2015-s-16-r</td>
<td>Meteoroid Environment on the Transfer Trajectories to Mars</td>
<td>Dusan Marceta</td>
<td>University of Belgrade, Serbia</td>
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<td>2015-s-17-r</td>
<td>Proposal of Photoelectron Emission Physical Model in Spacecraft Insulating Material</td>
<td>Kenji Yabe</td>
<td>Tokyo City University, Japan</td>
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<td>2015-s-18-t</td>
<td>Design of a Communications, Command and Data Handling System (CCDH) for Remote Sensing Microsatellite</td>
<td>Miguel Ángel Alvarado Zaragoza</td>
<td>National Autonomous University of Mexico, Mexico</td>
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<td>2015-s-19-u</td>
<td>National Awareness Creation and Education on Space Science through the Senior High Schools by the Use of Cansat</td>
<td>Manfred Quarshie</td>
<td>Regent University College of Science and Technology, Ghana</td>
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<td>2015-s-20-w</td>
<td>Experimental Study on Heat Release Performance of Chemical Igniter Used in NASA-STD-6001 BI/ISO/TS16697</td>
<td>Yuya Sugamura</td>
<td>Toyohashi University of Technology, Japan</td>
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### Technical Session Poster

**Session Date:** July 8 (Wed) 13:00 – 14:50  
**Room:** Kobe International Conference Center, Exhibition Hall  
**Chairpersons:**

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<th>Affiliation</th>
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<td>IEPC-2015-422p/ISTS-2015-b-422p</td>
<td>Design and Monte Carlo Simulation of a Vacuum Air-Intake Device Applied to Air-Breathing Electric Thruster</td>
<td>Yanwu Li, Danming Li, Junshang Li</td>
<td>Lanzhou Institute of Space Technology and Physics, China</td>
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<tr>
<td>IEPC-2015-423p/ISTS-2015-b-423p</td>
<td>Effect of Background Magnetic Field on Ionization in Hall Thruster</td>
<td>Yue Liu, Jing-Yu Liang, Shi-Qiao Du, Shu-Yi Huang, Fa-Zhi Yang, Zi-Geng Huang, Ying Wang, Zhao-Shuai Ma</td>
<td>Dalian University of Technology, China</td>
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<td>IEPC-2015-427p/ISTS-2015-b-427p</td>
<td>Multiply Charged Ions Depending on Magnetic Field Configuration in Hall Thruster Plasmas</td>
<td>Holak Kim¹, Youbong Lim¹, Jongho Seon², Wonho Choe¹</td>
<td>¹Korea Advanced Institute of Science and Technology (KAIST), Korea, ²Kyung Hee University, Korea</td>
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<tr>
<td>IEPC-2015-430p/ISTS-2015-b-430p</td>
<td>New Power System Architecture for Solar All-Electric Propulsion Spacecraft</td>
<td>Fu Ming¹, Zhang Dongli², Li Tiecai¹</td>
<td>¹Shenzhen Academy of Aerospace Technology, China, ²Harbin Institute of Technology, China</td>
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<td>IEPC-2015-434p/ISTS-2015-b-434p</td>
<td>Experimental Characterization of a Pulsed Plasma Deflagration Thruster with Advanced Power Processing Unit</td>
<td>Keith Loebner1, Andrea Lucca Fabris1, Luke Raymond2, Wei Liang3, James Szabó5, Juan Rivas-Davila6, Mark Cappelli1</td>
<td>1Stanford, Mechanical Engineering, USA, 2Stanford, Electrical Engineering, USA, 3Busak Co., Inc., USA</td>
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<tr>
<td>IEPC-2015-438p/ISTS-2015-b-438p</td>
<td>Comparison of Hall Thruster Ion Dynamics between Laser Induced Fluorescence Measurements and a 2-D Hybrid Simulation</td>
<td>Christopher V. Young1, Eunsun Cha1, Eduardo Fernandez2, Mark A. Cappelli1</td>
<td>1Stanford Plasma Physics Laboratory, USA, 2Eckerd College, USA</td>
</tr>
<tr>
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<td>2015</td>
<td>EEE Parts Program for Scientific Satellites</td>
<td>Yuya Kakehashi, Kazuyuki Hirose</td>
<td>ISAS/JAXA, Japan</td>
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<tr>
<td>2015</td>
<td>Screening and Radiation Evaluation of Electronic Devices for Space Applications</td>
<td>Kenta Noguchi, Yasuo Ishimaru, Hiroaki Asai, Kimiharu Karu, Yoshiya Iide, Yasuo Sakaide, Kenji Sugimoto, Katsuhiro Ohsono</td>
<td>High-Reliability Engineering &amp; Components Corporation, Japan</td>
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