### Final Program

#### July 5 (Sun) ####

<table>
<thead>
<tr>
<th>Room</th>
<th>9:00</th>
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<th>19:00</th>
<th>20:00</th>
<th>Other Events</th>
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<td>50th Years Anniversary Programs</td>
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<td>Exhibition</td>
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#### July 6 (Mon) ####

<table>
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<th>9:00</th>
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<th>19:00</th>
<th>20:00</th>
<th>Other Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hall 300</td>
<td>Opening</td>
<td>50th Anniversary Keynote Speech</td>
<td>Commendation Ceremony</td>
<td>National Space Program</td>
<td>IAA Astronautical Lecture</td>
<td>Reception (Okura Frontier Hotel)</td>
<td>Exhibition</td>
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<tr>
<td>Room 303</td>
<td>IAA Regional Meeting</td>
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</table>
The last letter “s” in the session number: the session includes the presentation(s) from Student Session.
### July 8 (Wed)

<table>
<thead>
<tr>
<th>Room</th>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>Hall 300</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9:00-10:00</td>
<td>c-1) 10:30-12:00 50 Years History and Future</td>
</tr>
<tr>
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<tr>
<td>Hall 200</td>
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<tr>
<td></td>
<td>9:00-10:40</td>
<td>b-6) 9:00-10:40 Planetary Environment Exploration (1) New Concepts for Mars Missions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b-7) 10:50-12:30 Planetary Environment Exploration (2) Magnetosphere and Climates of Terrestrial Planets</td>
</tr>
<tr>
<td>Room 101</td>
<td>9:00-10:20</td>
<td>b-3) 9:00-10:20 Electric Propulsion (3) Hall Thruster</td>
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<td>9:00-10:40</td>
<td>d-6) 9:00-10:40 Attitude Maneuver (1)</td>
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<td></td>
<td>d-7) 10:50-12:30 Formation Flight and Proximity Operations (1)</td>
</tr>
<tr>
<td>Room 202 A/B</td>
<td>9:00-10:40</td>
<td>m-1) 9:00-10:40 Geospace, Earth and Future Technologies</td>
</tr>
<tr>
<td>Room 202 B</td>
<td></td>
<td>m-2) 10:50-12:30 Space Telescope Missions</td>
</tr>
<tr>
<td>Room 303</td>
<td>9:00-10:20</td>
<td>b-1) 9:00-10:20 Fluid Physics (1)</td>
</tr>
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<td></td>
<td>9:00-10:40</td>
<td>b-2) 9:00-10:40 Structural Dynamics of Spacecraft</td>
</tr>
<tr>
<td>Room 405</td>
<td>9:00-10:40</td>
<td>n-5) 11:10-12:30 Earth Observation (5)</td>
</tr>
<tr>
<td>Room 406</td>
<td>9:00-11:30</td>
<td>a-6) 9:00-11:30 scramjet and Combined Cycle Engines</td>
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<td></td>
<td>9:00-11:30</td>
<td>a-7) 11:40-13:00 Airbreathing Engines</td>
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<tr>
<td><strong>Other Events</strong></td>
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</tbody>
</table>

### Technical Tour

**Half Day : 2 Courses**
(AIST, NIMS, KEK, Cyberdyne)

**Full Day : 1 Course**
(J-PARC)

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The last letter "a" in the session number: the session includes the presentation(s) from Student Session.
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<tr>
<th>Room</th>
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<th>Event</th>
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<tbody>
<tr>
<td>Hall 300</td>
<td>9:00-11:00</td>
<td>Innovation in Space Mission and Control Engineering (1)</td>
</tr>
<tr>
<td>Hall 200</td>
<td>9:00-11:00</td>
<td>Lunar Exploration (1), Robotic and Human Missions on the Lunar Surface</td>
</tr>
<tr>
<td>Room 101</td>
<td>9:00-11:00</td>
<td>Electric Propulsion (6)</td>
</tr>
<tr>
<td>Room 200 A/B</td>
<td>9:00-11:00</td>
<td>Dynamics and Control of Solar Sails and Tethers</td>
</tr>
<tr>
<td>Room 202 A</td>
<td>9:00-11:00</td>
<td>Deployable Structures</td>
</tr>
<tr>
<td>Room 303</td>
<td>10:00-11:00</td>
<td>Recent Results in the ISS</td>
</tr>
<tr>
<td>Room 405</td>
<td>10:00-11:00</td>
<td>Space Law and Policy</td>
</tr>
<tr>
<td>Room 406</td>
<td>10:00-11:00</td>
<td>THRuster and Detonation Engines</td>
</tr>
<tr>
<td>Room 200 A</td>
<td>11:00-12:00</td>
<td>Advanced Propulsion and New Concept (1)</td>
</tr>
<tr>
<td>Room 202 B</td>
<td>11:00-12:00</td>
<td>Balloon Technologies</td>
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<tr>
<td>Room 303</td>
<td>11:00-12:00</td>
<td>Monogravity Experiment Systems</td>
</tr>
<tr>
<td>Room 405</td>
<td>11:00-12:00</td>
<td>Thermal Protection System</td>
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<tr>
<td>Room 406</td>
<td>11:00-12:00</td>
<td>Space Tourism and Air Launch</td>
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<tr>
<td>Room 300</td>
<td>12:00-14:00</td>
<td>Panel-2: International Cooperation in Asian Pacific Region</td>
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<tr>
<td>Room 200 B</td>
<td>12:00-14:00</td>
<td>Electric and Advanced Propulsion (1)</td>
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<tr>
<td>Room 202 A</td>
<td>12:00-14:00</td>
<td>Attitude Maneuver (2)</td>
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<td>Room 303</td>
<td>12:00-14:00</td>
<td>Monogravity Experiment Systems</td>
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<tr>
<td>Room 405</td>
<td>12:00-14:00</td>
<td>Thermal Protection System</td>
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<tr>
<td>Room 406</td>
<td>12:00-14:00</td>
<td>Space Tourism and Air Launch</td>
</tr>
<tr>
<td>Room 300</td>
<td>14:00-16:00</td>
<td>Innovation in Space Mission and Control Engineering (2)</td>
</tr>
<tr>
<td>Room 200 B</td>
<td>14:00-16:00</td>
<td>Laser Propulsion</td>
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<tr>
<td>Room 202 A</td>
<td>14:00-16:00</td>
<td>Earth and Space Technology</td>
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<tr>
<td>Room 303</td>
<td>14:00-16:00</td>
<td>Monogravity Experiment Systems</td>
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<tr>
<td>Room 405</td>
<td>14:00-16:00</td>
<td>Thermal Protection System</td>
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<tr>
<td>Room 406</td>
<td>14:00-16:00</td>
<td>Space Tourism and Air Launch</td>
</tr>
<tr>
<td>Room 300</td>
<td>16:00-18:00</td>
<td>Outer Planet Exploration, Solar Sail Technology to Jupiter and Trojans</td>
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<tr>
<td>Room 200 B</td>
<td>16:00-18:00</td>
<td>Advanced Propulsion and New Concept (1)</td>
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<tr>
<td>Room 202 A</td>
<td>16:00-18:00</td>
<td>Attitude Maneuver (2)</td>
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<tr>
<td>Room 303</td>
<td>16:00-18:00</td>
<td>Monogravity Experiment Systems</td>
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<tr>
<td>Room 405</td>
<td>16:00-18:00</td>
<td>Thermal Protection System</td>
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<tr>
<td>Room 406</td>
<td>16:00-18:00</td>
<td>Space Tourism and Air Launch</td>
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<tr>
<td>Room 300</td>
<td>18:00-20:00</td>
<td>Panel-3: International Cooperation for the ISS (3)</td>
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<td>Room 200 B</td>
<td>18:00-20:00</td>
<td>Electric and Advanced Propulsion (1)</td>
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<tr>
<td>Room 202 A</td>
<td>18:00-20:00</td>
<td>Attitude Maneuver (2)</td>
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<tr>
<td>Room 303</td>
<td>18:00-20:00</td>
<td>Monogravity Experiment Systems</td>
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<tr>
<td>Room 405</td>
<td>18:00-20:00</td>
<td>Thermal Protection System</td>
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<tr>
<td>Room 406</td>
<td>18:00-20:00</td>
<td>Space Tourism and Air Launch</td>
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The last letter "s" in the session number: the session includes the presentation(s) from Student Session.

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### July 10 (Fri)

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<th>Time</th>
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<th>Session</th>
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<td>09:00-10:40 Advanced Propulsion and New Concept (2)</td>
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<td>g-4</td>
<td>09:00-10:20 Flight Test</td>
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<td>g-5</td>
<td>10:00-11:40 Lunar Science, Kaguya and Beyond (1)</td>
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<td>g-6</td>
<td>10:30-12:10 Advanced Solid Rocket</td>
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<td>g-7</td>
<td>14:00-16:00 Space Elevator (1)</td>
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<td>g-8</td>
<td>16:30-18:10 Space Elevator (2)</td>
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<td>18:30-20:30 Closing Ceremony (Entrance Hall)</td>
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<td>g-10</td>
<td>19:00-20:00 Technical Tour (JAIA Half-Day Tour)</td>
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<td>09:00</td>
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<td>09:00-11:00 Smart Satellite</td>
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<td>a-2</td>
<td>10:00-11:30 Planet Climate, Sensor and Device</td>
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<td>a-3</td>
<td>14:00-15:40 Space Medicine and Physiology</td>
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<td>a-4</td>
<td>15:50-17:30 Solar Power, Satellite and New International Missions</td>
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<td>09:00</td>
<td>b-1</td>
<td>10:00-12:00 Systems Engineering and Information Technology</td>
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<td>11:00-12:30 Small Satellite (1)</td>
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<td>14:00-16:20 Fluid Dynamics (1)</td>
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<td>b-4</td>
<td>16:30-18:30 Fluid Dynamics (2)</td>
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<td>b-5</td>
<td>17:00-18:30 Advanced Propulsion and New Concept (3)</td>
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<td>b-6</td>
<td>18:30-19:30 Space Education and Outreach (3)</td>
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<td>09:00</td>
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<td>10:00-11:40 Lunar Science, Kaguya and Beyond (2)</td>
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<td>c-2</td>
<td>14:00-16:00 Space Solar Power Systems</td>
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<td>c-3</td>
<td>16:10-18:10 Flight Programs</td>
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<td>c-4</td>
<td>18:30-20:30 Closing Ceremony (Entrance Hall)</td>
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**Notes:**
- The last letter "a" in the session number: the session includes the presentation(s) from Student Session.
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[o-1] 50 Years History and Future

**Session Date**: 2009/7/8 10:30 – 12:00  
**Room**: Hall 300  
**Chairpersons**:  
Hirotoshi Kubota (Teikyo University, Japan)  
Yasunori Matogawa (JAXA, Japan)

2009-o-1-01v (10:30-11:00)

**Prof. Hideo Itokawa and Early Stage of ISTS**

Iwao Kanazawa  
*President, Dynamic Arts, Japan*

2009-o-1-02v (11:00-11:30)

**Statistical Aspects of ISTS**

Hirotoshi Kubota  
*Teikyo University, Japan*

2009-o-1-03v (11:30-12:00)

**Recent Educational Activities of ISTS — A New Experience**

Yasunori Matogawa  
*Prof. Emeritus, JAXA, Japan*

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[o-2-1] International Space Station and Beyond (1)

**Session Date**: 2009/7/7 10:30 – 12:00  
**Room**: Hall 200  
**Chairpersons**:  
Masaaki Komatsu (JAXA, Japan)  
Isao Kanazawa (JAXA, Japan)

2009-o-2-01v (10:30-11:00)

**International Space Station — A Test Bed for Future Human Space Exploration**

Kirk Shireman  
*NASA, USA*

2009-o-2-02v (11:00-11:30)
Overview of Japanese Exposed Facilities in "KIBO" JEM

Katsuyoshi Arai, Koki Oikawa, Takayuki Shimoda, Kichiro Imagawa
JAXA, Japan

2009–o–2–03v ( 11:30–12:00 )

The First Science Experiment on KIBO

Hiroshi Kawamura¹, Kohichi Nishino², Atsushi Ohnishi³, Ichiro Ueno⁴
¹Suwa Tokyo University of Science, Japan, ²Yokohama National University, Japan, ³JAXA, Japan,
⁴Tokyo University of Science, Japan

[0–2–2] International Space Station and Beyond (2)

Session Date : 2009/7/7 14:30 – 16:00
Room : Hall 200
Chairpersons : Yasushi Hisadome (JAXA, Japan)
Takayuki Shimoda (JAXA, Japan)

Evolution of the Mobile Servicing System

Sarmad Aziz
Canadian Space Agency – NASA JSC, Canada

2009–o–2–04v ( 14:30–15:00 )

Overview of the Remote Manipulator System and Inter–orbit Communication System of "Kibo"

Fumihiro Kuwao, Hiroki Kumagai, Masaki Tanaka
NEC Corporation, Japan

2009–o–2–05v ( 15:00–15:30 )

The Feature and Mission Overview of EF(Exposed Facility) and ELM–ES (Experiment Logistics Module–Exposed Section)

Atsushi Murakami, Masaharu Takata
IHI AEROSPACE Co., Ltd, Japan

[0–2–3] International Space Station and Beyond (3)

Session Date : 2009/7/7 16:10 – 17:40
Room : Hall 200
Chairpersons : Tetsuro Yokoyama (JAXA, Japan)
Eiichiro Nakano (JAXA, Japan)
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<th>Session Date</th>
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<th>Chairpersons</th>
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<tr>
<td>2009-o-3-01v (10:00-10:30)</td>
<td>Hall 300</td>
<td>Manabu Kato (JAXA, Japan) Hironori Maejima (JAXA, Japan)</td>
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<td>2009-o-3-02v (10:30-10:50)</td>
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<td>Hisahiro Konishi, Hiroyuki Minamino, Nobuhito Nomura</td>
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<tr>
<td>2009-o-3-03v (10:50-11:10)</td>
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<td>Hirokazu Hoshino, Katsuhide Yonekura, Mina Ogawa, Kenji Ninomiya, Shin-ichi Sobue, Hayato Okumura, Manabu Kato, Susumu Sasaki</td>
</tr>
</tbody>
</table>
New Views of the Moon from the SELENE (KAGUYA)/LISM/Terrain Camera One-year Observation

Junichi Haruyama¹, Makiko Ohtake¹, Tsuneo Matsunaga¹, Tomokatsu Morota¹, Chikatoshi Honda¹, Yasuhiro Yokota¹, Yoshiko Ogawa², Kazuto Saiki³, Hideaki Miyamoto⁴, Akira Iwasaki⁴

¹JAXA, Japan, ²NIES, Japan, ³Osaka University, Japan, ⁴Tokyo University, Japan

A New Lunar Topographic Map of the Moon by the Laser Altimeter (LALT) on board KAGUYA

Hiroshi Araki¹, Seiichi Tazawa¹, Hirotomo Noda¹, Yoshiaki Ishihara¹, Sho Sasaki¹, Sander Goossens¹, Nobuyuki Kawano¹, Izumi Kamiya², Hisashi Ootake³, Juergen Oberst⁴, Che Shum⁵

¹National Astronomical Observatory of Japan, Japan, ²Geographical Survey Institute, Japan, ³JAXA, Japan, ⁴German Aerospace Center, Germany, ⁵Ohio State University, USA

Results of the Global Mapping of Lunar Gravity Field by KAGUYA, OKINA, and OUNA

Takahiro Iwata¹, Noriyuki Namiki², Hideo Hanada³, Koji Matsumoto³, Hirotomo Noda³, Yoshiaki Ishihara³, Sander Goossens³, Qinghui Liu³, Fuyuhiko Kikuchi³, Mina Ogawa¹, Nobuyuki Kawano³

¹JAXA, Japan, ²Kyushu University, Japan, ³National Astronomical Observatory of Japan, Japan

Lunar Radar Sounder Observations of Subsurface Geology and Natural Waves

Yasushi Yamaguchi¹, Takayuki Ono², Atsushi Kumamoto², Atsushi Yamaji³, Yoshiya Kasahara⁴, Takao Kobayashi⁵, Hiromu Nakagawa², Shoko Oshigami¹, Hiroshi Oya⁶

¹Nagoya University, Japan, ²Tohoku University, Japan, ³Kyoto University, Japan, ⁴Kanazawa University, Japan, ⁵Korea Institute of Geoscience and Mineral Resources, Korea, ⁶Fukui University of Technology, Japan
Mineralogical Survey of the Moon Using SELENE Multiband Imager and Spectral Profiler

Tsuneo Matsunaga¹, Makiko Ohtake², Junichi Haruyama²

¹National Institute for Environmental Studies, Japan, ²JAXA, Japan

Overview of Elemental Distributions on the Moon Observed by SELENE GRS

Nobuyuki Hasebe, Naoyuki Yamashita, Yuzuru Karouji, Shingo Kobayashi, Makoto Hareyama, Kanako Hayatsu, Shinpei Nemoto, Kazuya Iwabuchi, Yuko Takeda, Hiroshi Nagaoka, Koichi Tsukada

Waseda University, Japan

In-situ Measurement of Lunar Magnetic Field and Plasma: Results from MAP onboard KAGUYA

Yoshifumi Saito¹, Hideo Tsunakawa², Shoichiro Yokota¹, Takaaki Tanaka¹, Kazushi Asamura¹, Masaki Nishino¹, Tadateru Yamamoto³, Hidetoshi Shibuya⁴, Hisayoshi Shimizu³, Futoshi Takahashi², Masaki Matsushima²

¹JAXA, Japan, ²Tokyo Institute of Technology, Japan, ³University of Tokyo, Japan, ⁴Kumamoto University, Japan

Studying the Lunar Ionosphere with SELENE Radio Science Experiment

Takeshi Imamura, Takahiro Iwata

JAXA, Japan

A Lunar Landing Mission SELENE-2

Tatsuaki Hashimoto, Satoshi Tanaka, Takeshi Hoshino, Masatsugu Otsuki, Jun’ichiro Kawaguchi

JAXA, Japan
### Innovation in Space Mission and Control Engineering (1)

<table>
<thead>
<tr>
<th>Session Date</th>
<th>Room</th>
<th>Chairpersons</th>
</tr>
</thead>
</table>
| 2009-o-4-01v (9:00-9:30) | Hall 300 | Yasuyuki Miyazaki (Nihon University, Japan)  
Shoji Yoshikawa (MELCO, Japan) |

### Advanced Space Technologies in Space Science Missions – Space VLBI Mission ASTRO-G Project as an Example –

Hirobumi Saito¹, Shin-ichiro Sakai¹, Keisuke Yoshihara¹, Kousuke Kawahara¹, Masato Tsuboi¹, Yasuhiro Murata¹, Makoto Inoue²

¹JAXA, Japan, ²National Astronomical Observatory of Japan, Japan

### JASMINE: Infrared Space Astrometry Mission

Naoteru Gouda and JASMINE Working group

### Development of a Tether Based Space Walking Robot to be Tested on ISS/KIBO

Mitsushige Oda

JAXA, Japan

### Navigation, Guidance and Control Technologies for Lunar Landing Missions in Japan
2009-o-4-05v (11:00-11:30)
Guidance Navigation & Control Challenges for Hayabusa follow on Mission
Fuyuto Terui
JAXA, Japan

2009-o-4-06v (11:30-12:00)
System Requirements for Modern Satellite SAR Missions
Seisuke Fukuda
ISAS, JAXA, Japan

2009-o-4-07v (14:00-14:30)
First Solar Power Sail Demonstration by IKAROS
Osamu Mori, Hirotaka Sawada, Ryu Funase, Mutsuko Morimoto, Tatsuya Endo, Takayuki Yamamoto, Yuichi Tsuda, Yasuhiro Kawakatsu, Jun’ichiro Kawaguchi
JAXA, Japan

2009-o-4-08v (14:30-15:00)
Control Technologies Required for Electrodynamic Tethers and Active Debris Removal
Satomi Kawamoto\(^1\), Chiharu Kikkawa\(^2\), Yasushi Ohkawa\(^1\), Shin-ichiro Nishida\(^1\), Shoji Kitamura\(^1\)
\(^1\)JAXA, Japan, \(^2\)Tokyo Metropolitan University, Japan

2009-o-4-09v (15:00-15:30)
Hopes on Control Engineering for Challenging Nanosatellite Missions
Saburo Matunaga
Tokyo Institute of Technology, Japan

2009-o-4-10v (15:30-16:00)
High Energy X-Ray Sky Observation by the Formation Flight All Sky Telescope
Hiroshi Tsunemi¹, Kiyoshi Hayashida¹, Naohisa Anabuki¹, Rui Sakaguchi¹, Hideyo Kunieda², Yasushi Ogasaka², Masayuki Itoh³, Masanobu Ozaki⁴, Isao Kawano⁴, and FFAST team
¹Osaka University, Japan, ²Nagoya University, Japan, ³Kobe University, Japan, ⁴JAXA, Japan

2009-o-4-11v (16:00–16:30)

DECIGO: the Japanese Space Gravitational Wave Antenna
Masaki Ando¹, Seiji Kawamura², Naoki Seto¹, Shuichi Sato³, Ikkoh Funaki⁴, Takashi Nakamura¹, Kimio Tsubono¹, Akito Araya¹, Kunihito Ioka⁵, Nobuyuki Kanda⁶, Shigenori Moriwaki¹
¹Kyoto University, Japan, ²National Astronomical Observatory, Japan, ³Hosei University, Japan, ⁴JAXA, Japan, ⁵KEK, Japan, ⁶Osaka City University, Japan

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[a-1] Liquid Rocket (1) Engine System

Session Date : 2009/7/7 9:00 – 11:00
Room : Room 406
Chairpersons : Bernhard Hidding (Institute for Laser and Plasma Physics, Germany)
Takuo Onodera (JAXA, Japan)

2009-a-01 (9:00–9:20)

SNECMA SPACE ENGINES DIVISION : Six Decades of Liquid Rocket Propulsion
Christophe Rothmund¹, Jean-Paul Parent²
¹Sneca, France, ²Sneca Tokyo, Japan

2009-a-02 (9:20–9:40)

LOX/Kerosene Fueled Rocket Engine Study in MHI
Kimihito Obase, Kenichi Niu, Takashi Tamura
Mitsubishi Heavy Industries, Ltd, Japan

2009-a-03 (9:40–10:00)

The MB-60 Cryogenic Upper Stage Engine – A World Class Propulsion System
William Sack¹, Kenji Kishimoto¹, Akira Ogawara², Masahiro Atsumi², Yoshikawa Kimito²
¹Pratt & Whitney Rocketdyne, USA, ²Mitsubishi Heavy Industries, Japan

2009-a-04 (10:00–10:20)

Visualization and Optimization of LE-X Engine System Margin
[a-2] Liquid Rocket (2) Component Technology 1

Session Date: 2009/7/7 11:10 - 12:30  
Room: Room 406  
Chairpersons: William Sack (Pratt & Whitney Rocketdyne, USA)  
Hideo Sunakawa (JAXA, Japan)

2009-a-07 (11:10-11:30)

Theoretical and Experimental Discourse on Laser Ignition in Liquid Rocket Engines

Chiara Manfletti  
German Aerospace Center (DLR – Deutsches Zentrum fuer Luft- und Raumfahrt), Germany

2009-a-08 (11:30-11:50)

Spiking of Hydrocarbon Fuels with Silanes-based Combustion Enhancers

Bernhard Hidding¹, Mustapha Fikri², Christof Schulz², Andreas Kornath³, Michael Pfitzner⁴, Martin Lang⁵, Domenico Simone⁶, Claudio Bruno⁶  
¹Heinrich-Heine-University Duesseldorf, Institute for Laser and Plasma Physics, Germany,  
²University Duisburg-Essen, Germany, ³Ludwig-Maximilians-University Munich, Germany,  
⁴University of the Armed Forces, Germany, ⁵ESTEC, The Netherlands, ⁶University “La Sapienza”, Italy

2009-a-09 (11:50-12:10)

Progress Report on Preliminary Design of the LE-X Components

Makoto Kojima¹, Hideo Sunakawa¹, Akihide Kurosu¹, Koichi Okita¹, Akira Ogawara², Tadaoki Onga²  
¹JAXA, Japan, ²MHI Nagoya Guidance & Propulsion System Works, Japan

2009-a-06 (10:40-11:00)

Challenge Towards Ultimately Robust Design—Methods and Their Support Systems for the LE-X Engine

Nobuyuki Iizuka¹, Koichi Okita¹, Takashi Koganezawa¹, Hajime Taguchi¹, Keiichiro Fujimoto¹, Hideo Sunakawa¹, Akihide Kurosu¹, Hiroshi Miyoshi¹, Kozo Fujii¹, Akira Ogawara², Yoshihiro Kawata²  
¹JAXA, Japan, ²MHI, Japan
Stratification and Destratification Effects in Pressurized Cryogenic Tanks

Tim Arndt¹, Michael Dreyer¹, Philipp Behruzi², Mike Winter², Arnold van Foreest³
¹ZARM, University of Bremen, Germany, ²EADS Astrium ST Bremen, Germany, ³DLR Bremen, Germany

2009-a-10 (12:10-12:30)

Experimental and Numerical Investigation of Liquid Propellant Draining from a Rocket Tank

Kiyoshi Kinefuchi¹, Toru Kamita¹, Hideyo Negishi¹, Keisuke Yamada², Masanobu Fujimura²
¹JAXA, Japan, ²IHI Aerospace, Co., Ltd., Japan

2009-a-11 (14:00-14:20)

A Study of Boiling Heat Transfer in the LOX/LNG Engine Injector

Kenichi Hirai¹, Akinaga Kumakawa², Hiroshi Tamura², Yoshihiro Torii²
¹IHI Aerospace Co., Ltd., Japan, ²JAXA, Japan

2009-a-12 (14:20-14:40)

An Experimental Study of Automobile Turbocharger-derived Rocket Turbopumps

Tatsuhiro Nozue¹, Koki Shiohata², Chikara Tachikawa², Koji Okamoto³, Osamu Imamura³, Toshiaki Kobayashi⁴, Yoshio Fujinuma⁵, Hiroaki Sasaki⁶, Takashi Aoyagi⁷, Syuusuke Hori⁷, Tomio Nakano¹
¹Japan Manned Space Systems Corporation(JAMSS), Japan, ²Ibaraki University, Japan, ³The University of Tokyo, Japan, ⁴Kobayashi Seisakusho Co.,Ltd, Japan, ⁵Ibaraki Prefectural Industrial Technology Center, Japan, ⁶NPO Globalis Japan., Japan, ⁷JAXA, Japan

2009-a-13 (14:40-15:00)

Reduced Cavitation for Turbomachinery Operation

Kevin Lunde¹, Sen Meng¹, Yoshinobu Tsujimoto², Toshifumi Watanabe²
¹Pratt & Whitney Rocketdyne, USA, ²Osaka University, Japan
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<th>Session Date</th>
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<tbody>
<tr>
<td>Title</td>
<td>Latest Technologies Applied for LE-X Turbopumps</td>
</tr>
<tr>
<td>Authors</td>
<td>Shusuke Hori¹, Koichi Okita¹, Masaharu Uchiumi¹, Satoshi Kobayashi², Tsutomu Mizuno²</td>
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<td>Affiliations</td>
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<tr>
<td>Title</td>
<td>Combustion Modeling of Tetra-ol Glycidyl Azide Polymer</td>
</tr>
<tr>
<td>Authors</td>
<td>Koji Fujisato¹, Yutaka Wada², Yoshio Seike³, Makihito Nishioka⁴, Keiichi Hori⁵</td>
</tr>
<tr>
<td>Affiliations</td>
<td>The University of Tokyo, Japan, Graduate University for Advanced Studies, Japan, NOF Corporation, Japan, University of Tsukuba, Japan, ISAS/JAXA, Japan</td>
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<tr>
<td>Title</td>
<td>Application of Tetra-ol Glycidyl Azide Polymer to Hybrid Motor</td>
</tr>
<tr>
<td>Authors</td>
<td>Yuya Nomura¹, Yutaka Wada², Koji Fujisato³, Kiyokazu Kobayashi⁴, Keiichi Hori⁴</td>
</tr>
<tr>
<td>Affiliations</td>
<td>Department of Human Sensing and Functional Sensor Engineering, Yamagata University, Japan, University for Advanced Studies, Tokyo University, Japan, ISAS/JAXA, Japan</td>
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<tr>
<td>Title</td>
<td>An Experimental Research on Low Melting Temperature Thermoplastic Propellant (LTP) for the Next Generation Solid Rocket</td>
</tr>
<tr>
<td>Authors</td>
<td>Apollo Fukuchi¹, Shin Matsuura¹, Shigefumi Miyazaki¹, Takemasa Koreki¹, Hisao Okamoto², Keiichi Hori³, Yasuhiro Morita³, Ryojiro Akiba⁴</td>
</tr>
<tr>
<td>Affiliations</td>
<td>IHI Aerospace Co., Ltd., Japan, IHI Aerospace Engineering Co., Ltd., Japan, The Institute of Space and Astronautical Science (ISAS), Japan, Hokkaido Aeronautical Science and Technology Incubation Center, Japan/ISAS</td>
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<th>Session Date</th>
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<tr>
<td>Title</td>
<td>Effect of Composite Propellant Stretch on its Burn Rate</td>
</tr>
<tr>
<td>Authors</td>
<td>Sergey Rashkovskiy¹, Yuriy Milyokhin², Alexander Klyuchnikov², Alexander Fedorychev²</td>
</tr>
<tr>
<td>Affiliations</td>
<td>Institute for Problems in Mechanics, Russia, The Federal Center for Dual-Use Technologies &quot;Soyuz&quot;, Russia</td>
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**[a-5] Solid and Hybrid Rocket (2)**

**Session Date**: 2009/7/7 17:00 – 18:20  
**Room**: Room 406  
**Chairpersons**: Apollo Fukuchi (IHI Aerospace Co., Ltd., Japan)  
Shinichiro Tokudome (JAXA, Japan)

---

2009-a-19 (17:00–17:20)

**Combustion-Characteristic-Based Active Thrust Modulation of a Solid Rocket Motor**  
Masafumi Tanaka¹, Guillaume Gaspard², Katsuya Urakawa¹  
¹National Defense Academy, Japan, ²Military Academy of Saint-Cyr, France

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2009-a-20 (17:20–17:40)

**The Effect of Fuel Grain Size on the Combustion Characteristics in the Primary Combustion Chamber of Staged Combustion Hybrid Rocket**  
Harunori Nagata, Kenta Hashiba, Hiroya Sakai, Tsuyoshi Totani, Masashi Wakita  
Hokkaido University, Japan

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2009-a-21 (17:40–18:00)

**Advanced Computer Science on Internal Ballistics of Solid Rocket Motors**  
Toru Shimada¹, Kazushige Katoh², Nobuhiro Sekino³, Nobuyuki Tsuboi¹, Yoshio Seike², Mihoko Fukunaga³, Yu Daimon¹, Hiroshi Hasegawa², Hiroya Asakawa³  
¹JAXA, Japan, ²NOF Corporation, Japan, ³IHI Aerospace Co., Ltd., Japan

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2009-a-22 (18:00–18:20)

**Numerical Simulation of Structure of Burnt Zone of Metallized Composite Propellants**  
Sergey Rashkovskiy  
Institute for Problems in Mechanics, Russia

**[a-6] Scramjet and Combined Cycle Engines**

**Session Date**: 2009/7/8 9:00 – 11:30  
**Room**: Room 406  
**Chairpersons**: Harunori Nagata (Hokkaido University, Japan)  
Tetsuya Sato (Waseda University, Japan)

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2009-a-40 (9:00–9:20)

**Preliminary Sizing of Hypersonic Airbreathing Airliner**
### 2009-a-23 (9:20-9:40)

**Modeling LiH Combustion in Solid Fuelled Scramjet Engines**

Domenico Simone, Claudio Bruno  
*University of Rome “Sapienza”, Italy*

### 2009-a-24 (9:40-10:10)

**Korean Research Activities on the Scramjet Engine**

In-Seuck Jeung¹, Soo-Seok Yang²  
¹*Seoul National University, Korea, ²KARI, Korea*

### 2009-a-25 (10:10-10:30)

**Recent Activities in Research of the Combined Cycle Engine at JAXA**

Kouichiro Tani, Sadatake Tomioka, Kanenori Kato, Syuichi Ueda, Masao Takegoshi  
*JAXA, Japan*

### 2009-a-26 (10:30-10:50)

**Dual-mode Operation of a Rocket-Ramjet Combined Cycle Engine**

Sadatake Tomioka¹, Kouichiro Tani¹, Ryoh Masumoto², Shuuichi Ueda¹  
¹*JAXA, Japan, ²Tokyo Institute of Technology, Japan*

### 2009-a-27 (10:50-11:10)

**Numerical Simulation of Airflow Mach Number Effects to the Ejector Performance In a RBCC Engine Model at Sub/Transonic Flight Region**

Susumu Hasegawa, Kouichiro Tani  
*JAXA, Japan*

### 2009-a-28 (11:10-11:30)

**Development Status of A Precooled Turbojet Engine**

Tetsuya Sato¹, Hideyuki Taguchi², Hiroaki Kobayashi², Takayuki Kojima², Motoyuki Hongoh², Kenya Harada², Daisaku Masaki², Keiichi Okai², Kazuhisa Fujita², Shujiro Sawai²  
¹*Waseda University, Japan, ²JAXA, Japan*
Wind Energy Problems

Session Date: 2009/7/8 11:40 – 13:00
Room: Room 406
Chairpersons: Domenico Simone (University of Rome “La Sapienza”, Italy)
Sadatake Tomioka (JAXA, Japan)

*The last letter “s” in the program number is the presentation(s) from Student Session.

2009-a-29s (11:40-12:00)
Dynamic Simulations of Liquid Hydrogen Supply System for the Pre-cooled Turbo Jet Engine
Katsuyoshi Otsuka
Waseda University, Japan

2009-a-30s (12:00-12:20)
An Experimental Study on Supersonic Inlet Buzz
Keita Miyamura
Waseda University, Japan

2009-a-31s (12:20-12:40)
Experimental Research on Suction Performance of Rocket Based Combined Cycle Engine
Takashi Sugio
Tokyo Institute of Technology, Japan

2009-a-32s (12:40-13:00)
2D Simulation of Deflagration to Detonation Transition in a Tube
Assylkhan Bibossinov
Kazakh National University, Kazakhstan

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[page break]

Wind Energy Problems

Session Date: 2009/7/9 9:00 – 11:00
Room: Room 406
Chairpersons: In-Seuck Jeung (Seoul National University, Korea)
Jiro Kasahara (University of Tsukuba, Japan)

2009-a-33 (9:00-9:20)
Combustion Characteristics of Han-based Liquid Monopropellant
Ryuta Matsuda¹, Toshiyuki Katsumi², Hiroyuki Kodama³, Tetsuya Matsuo⁴, Junichi Nakatsuka⁵, Katsuya Hasegawa⁵, Kiyokazu Kobayashi⁵, Shujiro Sawai⁵, Keiichi Hori⁵
¹Tokai University, Japan, ²The Graduate University for Advanced Studies (SOKENDAI), Japan,
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<td>2009-a-35 ( 9:40-10:00 )</td>
<td>Propulsion Concept for a Lunar Transportation System Based on In-Situ Propellant</td>
<td>Armin Herbertz</td>
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<td>2009-a-36 ( 10:00-10:20 )</td>
<td>Laboratory Characterization of a Complete Cold Gas Micropropulsion System for Nanosatellite Attitude Control and Formation Flight</td>
<td>Giulio Manzoni, Yesie Lestari Brama, Adam Austin, Rob Conde</td>
</tr>
</tbody>
</table>

[b-1] Electric Propulsion (1) Ion Thruster

**Session Date**: 2009/7/7 9:00 - 10:40  
**Room**: Room 101  
**Chairpersons**: Toru Hyakutake (Okayama University, Japan)  
Ikkoh Funaki (JAXA, Japan)
2009-b-01 (9:00-9:20)
Switching Operation of Ion Beam and Electron Emission Using Micro-Ion Engine
Hiroyuki Koizumi, Hitoshi Kuninaka
JAXA, Japan

2009-b-02 (09:20-09:40)
Numerical Prediction of Grid Erosion of Ion Engine
Tsutomu Kobayashi, Takeshi Miyasaka, Katsuo Asato
Gifu University, Japan

2009-b-03 (9:40-10:00)
Plasma Properties in a miniature Microwave Discharge Ion Thruster
Toru Ezaki, Naoji Yamamoto, Teppei Tsuru, Usuke Kotani, Hideki Nakashima, Naoto Yamasaki, Kentaro Tomita, Kiichiro Uchino
Kyushu University, Japan

2009-b-04 (10:00-10:20)
Experimental Study on Air Breathing Ion Engine Using a Laser–detonation Atomic Oxygen Beam Source as LEO Space Environment Simulator
Masahito Tagawa¹, Kazutaka Nishiyama², Kumiko Yokota¹, Yasuo Yoshizawa¹, Daisaku Yamamoto¹, Hitoshi Kuninaka²
¹Kobe University, Japan, ²JAXA/ISAS, Japan

2009-b-05 (10:20-10:40)
Development of the Endurance Test System for 20-cm Class Microwave Ion Thruster
Satoshi Hosoda¹, Kazutaka Nishiyama², Yasuhiro Toyoda³, Hitoshi Kuninaka²
¹ISAS, JAXA, Japan, ²JAXA, Japan, ³University of Tokyo, Japan

[b-2] Electric Propulsion (2) Ion Thruster, Neutralizer and Cathode

Session Date : 2009/7/7 10:50 – 12:10
Room : Room 101
Chairpersons : Stephen Gabriel (University of Southampton, UK)
Naoji Yamamoto (Kyushu University, Japan)

2009-b-06 (10:50-11:10)
Modification of a Three-dimensional Electrostatic Particle-In-Cell Code Adopting a Nested Grid
### R&D of Carbon Nanotube Cathodes for Electric Propulsion

Takanobu Muranaka, Hiroko Ueda, Hideyuki Usui, Iku Shinohara  

1. JEDI, JAXA, Japan  
2. JAXA, Japan  
3. JST/CREST, Japan  
4. Kyoto University, Japan  

Yasushi Ohkawa, Asami Izawa, Yoshiki Yamagiwa, Satomi Kawamoto, Shoji Kitamura  

1. JAXA, Japan  
2. Shizuoka University, Japan  

### Operational Characteristics of a Microwave Discharge Neutralizer for the ECR Ion Thruster mu20

Kazutaka Nishiyama, Satoshi Hosoda, Hitoshi Kuninaka  

JAXA, Japan  

### Research of Microhollow Cathode Discharge for the Application to Micro Plasma Thrusters

Guangqing Xia, Genwang Mao, Maolin Chen, Chuijie Wu  

1. Dalian University of Technology, China  
2. Northwestern Polytechnical University, China  

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**Electric Propulsion (3) Hall Thruster**

**Session Date:** 2009/7/8 9:00 - 10:20  
**Room:** Room 101  
**Chairpersons:** Takeshi Miyasaka (Gifu University, Japan)  
Shigeru Yokota (The University of Tokyo, Japan)

### Performance Prediction in Long Operation for Magnetic-Layer-Type Hall Thrusters

Tsuyoshi Fujita, Yudai Shimizu, Takayoshi Shinya, Takuma Tonari, Hirokazu Tahara  

Osaka Institute of Technology, Japan

### Development of Real-time Erosion Monitoring System for Hall Thrusters by Cavity Ring-Down Spectroscopy

Naoji Yamamoto, Lei Tao, Azer Yalin  

1. Kyushu University, Japan  
2. Colorado State University
Influence of Hollow Anode Configuration on Performance of Anode-Layer Hall Thrusters
Yudai Shimizu, Takayoshi Shinya, Tsuyoshi Fujita, Takuma Tonari, Hirokazu Tahara
Osaka Institute of Technology, Japan

Investigation of the Ion Current Oscillation and Erosion with Cross-field Ion Transport and Recombination Effects in Hall Thrusters
YasuNori Nejoh¹, Yoshihisa Maruko¹, Yuki Yamamura², Hirokazu Tahara³
¹Hachinohe Institute of Technology, Japan, ²Toshiba Cooperation, Japan, ³Osaka Institute of Technology, Japan

Pulsed Plasma Thruster Development at IRS
Tony Schoenherr¹, Anuscheh Nawaz², Matthias Lau², Georg Herdrich²
¹University of Tokyo, Japan, ²Universitaet Stuttgart, Germany

Flowfield Calculation of Electrothermal Pulsed Plasma Thrusters onboard the Osaka Institute of Technology Small Satellite
Yusuke Ishii, Hiroki Takagi, Tsuyoshi Yamamoto, Hirokazu Tahara
Osaka Institute of Technology, Japan

Performance Enhancement of Electrothermal Pulsed Plasma Thrusters for Osaka Institute of Technology Electric-Rocket-Engine onboard Small Space Ship
Hiroki Takagi, Tsuyoshi Yamamoto, Yusuke Ishii, Hirokazu Tahara
Osaka Institute of Technology, Japan

Characterization of Co-axial Pulsed Plasma Thruster by High Speed Photography
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<tr>
<td>2009-b-18</td>
<td>11:50-12:10</td>
<td>Propellant Feed System for Powdered Propellant PPT</td>
<td>Takefumi Saito(^1), Hiroyuki Koizumi(^2), Hitoshi Kuninaka(^2)</td>
<td>Gifu University, Japan</td>
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<td>(^1)The University of Tokyo, Japan, (^2)ISAS/JAXA, Japan</td>
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<td>2009-b-19</td>
<td>12:10-12:30</td>
<td>Propulsive Performance Measurement of a Rectangular Laser-Electromagnetic Hybrid Thruster</td>
<td>Yoshiaki Kishida(^1), Hiroki Waragai(^1), Hideyuki Horisawa(^1), Ikko Funaki(^2)</td>
<td>Tokai University, Japan, JAXA, Japan</td>
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<td>(^1)Tokai University, Japan, (^2)JAXA, Japan</td>
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<tr>
<td>[b-5] Electric Propulsion (5) Electrothermal, Electromagnetic and Microwave Thrusters</td>
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<td>2009/7/9 9:00</td>
<td>Preliminary Thrust Performance Test of a Micro Multi-Plasmajet-Array Thruster</td>
<td>Shuji Hagiwara(^1), Hideyuki Horisawa(^1), Fujimi Sawada(^1), Ikkoh Funaki(^2)</td>
<td>University of Tokai, Japan, JAXA, Japan</td>
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<td>Kazutaka Nishiyama (JAXA, Japan)</td>
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<td>2009-b-20</td>
<td>9:00-9:20</td>
<td>Microwave-Excited Microplasma Thruster: Design of Improved Model Aiming for Flight</td>
<td>Takeshi Takahashi, Yugo Ichida, Shunsuke Kitanishi, Koji Eriguchi, Kouichi Ono</td>
<td>Kyoto University, Japan</td>
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<td>2009-b-21</td>
<td>9:20-9:40</td>
<td>Effect of Applied Magnetic Field on a Microwave Plasma Thruster</td>
<td>Juan Yang, Yingqiao Xu, Zhiqiang Meng, Tielian Yang</td>
<td>Northwestern Polytechnic University, China</td>
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<td>2009-b-22</td>
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### Electric and Advanced Propulsion (1) Electric Propulsion

**Session Date**: 2009/7/9 10:30 – 12:10  
**Room**: Room 101  
**Chairpersons**: Hirokazu Tahara (Osaka Institute of Technology, Japan)  
Masahito Tagawa (Kobe University, Japan)

*The last letter “s” in the program number is the presentation(s) from Student Session.*

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<td>2009-b-24s</td>
<td>Enhancement Thrust Force of the ECR Ion Thruster mu10</td>
<td>Ryudo Tsukizaki</td>
<td>The University of Tokyo, Japan</td>
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<td>2009-b-25s</td>
<td>Experimental Study of a 2D–Applied Field MagnetoPlasmaDynamics Thruster</td>
<td>Akira Iwakawa</td>
<td>The University of Tokyo, Japan</td>
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<td>2009-b-26s</td>
<td>Design of a Pulse Injector for DME Propellant</td>
<td>Masato Fukunaga</td>
<td>Kyushu Institute of Technology, Japan</td>
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<td>2009-b-27s</td>
<td>Numerical Simulation of a Hydrogen Magnetoplasmodynamic Arcjet</td>
<td>Hiroki Sato</td>
<td>The Graduate University for Advanced Studies, Japan</td>
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<td>2009-b-28s</td>
<td>Numerical Analysis of Plasma–wall Transition in a Hall Thruster Channel</td>
<td>Kentaro Hara</td>
<td>University of Tokyo, Japan</td>
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### Electric and Advanced Propulsion (2) Laser Propulsion

**Session Date**: 2009/7/9 14:00 – 15:40  
**Room**: Room 101  
**Chairpersons**: Masakatsu Nakano (Tokyo Metropolitan College of Industrial Technology, Japan)  
Hideyuki Horisawa (Tokai University, Japan)
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<td>Calculation of Impulse Generated by Pulse Laser Ablation on Polyacetal&lt;br&gt;Katsuhiro Ichihashi&lt;br&gt;Nagoya University, Japan</td>
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<td>2009-b-30s</td>
<td>Improvement of Propulsive Performance of Laser Ignition Micro Solid Rocket&lt;br&gt;Ryo Kondo&lt;br&gt;University of Tokyo, Japan</td>
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<td>2009-b-31s</td>
<td>Time-resolved Measurement of Ablation Pressure Using Velocity Interferometer&lt;br&gt;Shingo Suzuki&lt;br&gt;Nagoya University, Japan</td>
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<tr>
<td>2009-b-32s</td>
<td>Laser Supported Detonation Generated by a Solid Laser&lt;br&gt;Toshikazu Yamaguchi&lt;br&gt;The University of Tokyo, Japan</td>
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<td>2009-b-33s</td>
<td>Impulse Measurements of a Liquid-Propellant Laser Thruster for Various Target Materials and Propellants with a Horizontal Momentum Measuring Lever&lt;br&gt;Bin Wang&lt;br&gt;University of Science and Technology of China, China</td>
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**Advanced Propulsion and New Concept (1) Laser Propulsion**

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<td>Chairpersons</td>
<td>: Satoshi Hosoda (JAXA, Japan)  &lt;br&gt; Yoshihiro Kajimura (Kyoto University, Japan)</td>
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<tr>
<th>Time</th>
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<tr>
<td>2009-b-34</td>
<td>Numerical Analysis on Thermal Non-equilibrium and Multidimensional Laser-Supported Detonation Wave Using Multiply-Charged Ionization Model&lt;br&gt;Hiroyuki Shiraishi</td>
</tr>
</tbody>
</table>
2009-b-35 (16:10-16:30)
Laser Propulsion: Its Mechanisms and Potentials
Bin Wang, Kimiya Komurasaki, Yoshihiro Arakawa
University of Tokyo, Japan

2009-b-36 (16:30-16:50)
Propulsive Characteristics of a Laser-Electrostatic Acceleration Hybrid Thruster
Hideyuki Horisawa¹, Tomohisa Ono¹, Tadaki Shinohara¹, Ikko Funaki²
¹Tokai University, Japan, ²JAXA, Japan

2009-b-37 (16:50-17:10)
Magnetic Thrust Chamber Propulsion System for Controlling Laser-Produced Plasma by Magnetic Fields
Akihiro Maeno¹, Nobuo Matsuda¹, Tomonori Hanaya¹, Hideki Nakashima¹, Shinsuke Fujioka², Atsushi Sunahara², Tomoyuki Johzaki², Yoshitaka Mori³
¹Kyushu University, Japan, ²Osaka University, Japan, ³The Graduate School for the Creation of New Photonics Industries

2009-b-38 (17:10-17:30)
Numerical Analysis on Effects of Incident Laser Wavelength in Thermal Non-equilibrium Laser-Supported Detonation Wave
Hiroyuki Shiraishi, Manabu Nakamori, Takuya Koide
Daido University, Japan

[b-9] Advanced Propulsion and New Concept (2) Magnetic Sail

Session Date: 2009/7/10 9:00 - 10:20
Room: Hall 200
Chairpersons: Makoto Matsui (Shizuoka University, Japan)
Yoshiyuki Takao (Nishinippon Institute of Technology, Japan)

2009-b-39 (9:00-9:20)
The Dynamic Behaviour of a Magnetic Sail in Laboratory
Yuya Oshio¹, Ikko Funaki², Kazuma Ueno¹, Tomohiro Ayabe³
¹Graduate University for Advanced Studies, Japan, ²JAXA, Japan, ³Tokai University, Japan

2009-b-40 (9:20-9:40)
# 3D Hybrid Simulation of Pure Magnetic Sail including Ion–Neutral Collision Effect in Laboratory

Yoshihiro Kajimura\textsuperscript{1}, Kazuma Ueno\textsuperscript{2}, Ikkoh Funaki\textsuperscript{3}, Hideyuki Usui\textsuperscript{1}, Masanori Nunami\textsuperscript{1}, Iku Shinohara\textsuperscript{3}, Masao Nakamura\textsuperscript{4}, Hiroshi Yamakawa\textsuperscript{1}

\textsuperscript{1}Kyoto University, Japan, \textsuperscript{2}The Graduate University for Advanced Studies, Japan, \textsuperscript{3}JAXA, Japan, \textsuperscript{4}Osaka Prefecture University, Japan

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### 2009-b-41 ( 9:40-10:00 )

**Magnetic Inflation of Magnetic Plasma Sail by One Component Plasma Simulation**

Daisuke Akita\textsuperscript{1}, Hiroko Ueda\textsuperscript{2}, Iku Shinohara\textsuperscript{2}, Ikkoh Funaki\textsuperscript{2}, Hideyuki Usui\textsuperscript{3}

\textsuperscript{1}Tokyo Institute of Technology, Japan, \textsuperscript{2}JAXA, Japan, \textsuperscript{3}Kyoto University, Japan

---

### 2009-b-42 ( 10:00-10:20 )

**Characterization of Magnetoplasma Sail in Laboratory**

Kazuma Ueno\textsuperscript{1}, Tomohiro Ayabe\textsuperscript{2}, Yuya Oshio\textsuperscript{1}, Ikkoh Funaki\textsuperscript{3}, Hideyuki Horisawa\textsuperscript{2}, Hiroshi Yamakawa\textsuperscript{4}

\textsuperscript{1}The Graduate University for Advanced Studies, Japan, \textsuperscript{2}Tokai University, Japan, \textsuperscript{3}JAXA, Japan, \textsuperscript{4}Kyoto University, Japan

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### Electric and Advanced Propulsion (3) Advanced Propulsion and New Concept

**Session Date** : 2009/7/10 10:30 – 11:50  
**Room** : Hall 200  
**Chairpersons** : Yoshiki Yamagiwa (Shizuoka University, Japan)  
Yoshinori Nakayama (National Defense Academy, Japan)

*The last letter “s” in the program number is the presentation(s) from Student Session.*

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### 2009-b-43s ( 10:30-10:50 )

**Development of Lifetime Evaluation Method Using Multilayer Coating Chip**

Shinatora Cho  
*The University of Tokyo, Japan*

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### 2009-b-44s ( 10:50-11:10 )

**Numerical Analysis on Detonation and Thrust Production Processes in a Microwave Rocket**

Yutaka Shimada  
*University of Tokyo, Japan*
Three-Dimensional Numerical Analyses of Performance Characteristics of Experimental Scale Scramjet Driven MHD Generator

Toru Takahashi
University of Tsukuba, Japan

Energy Balance in a Radio Frequency Electro-thermal Thruster with Water Propellant

Masashi Oya
Kyushu University, Japan

A Study of a Shock Wave Supported by Millimetre Wave Plasma in Microwave Rocket

Yasuhisa Oda, Ken Kajiwara, Koji Takahashi, Atsushi Kasugai, Keishi Sakamoto, Toshikazu Yamaguchi, Yuya Shiraishi, Kimiya Komurasaki

1Japan Atomic Energy Agency, Japan, 2The University of Tokyo, Japan

A Preliminary Study of Mars Atmosphere Electric Propulsion

Yoshinori Nakayama
National Defense Academy, Japan

A Generic Model for a Transpiration Cooled Fusion Propulsion System

Dejan Petkow, Roland Gabrielli, Georg Herdrich, Rene Laufer, Oliver Zeile

Universitaet Stuttgart, Germany

Numerical Study on Application of MHD Generator and Accelerator to Scramjet Engine

Yoshiaki Maehara, Kojiro Suzuki
The University of Tokyo, Japan
2-D Electrospray Array Micro-thrusters Using Porous Emitter Substrates
Daniel Courtney, Paulo Lozano
Massachusetts Institute of Technology, USA

Atomistic Numerical Approach to Electrospray Thrusters
Nanako Takahashi, Paulo Lozano
Massachusetts Institute of Technology, USA

PERSEUS - In-Orbit Validation for Electric Propulsion Systems TALOS and SIMP-LEX
Dagmar Bock¹, Matthias Lau¹, Tony Schoenherr², Birk Wollenhaupt¹, Georg Herdrich¹, Hans-Peter Roeser¹
¹Universitaet Stuttgart, Germany, ²University of Tokyo, Japan

Laser Ignition Microthruster Experiments on KKS-1
Masakatsu Nakano¹, Hiroyuki Koizumi², Masashi Watanabe³, Yoshihiro Arakawa⁴
¹Tokyo Metropolitan College of Industrial Technology, Japan, ²JAXA, Japan, ³Nichiyu Giken Kogyo Co., LTD., Japan, ⁴the University of Tokyo, Japan

Research and Development of a New Power Processing Control Unit of Ion Engine System for the Super Low Altitude Test Satellite
Hitoshi Nagano¹, Kenichi Kajiwara¹, Hiroyuki Osuga², Toshiyuki Ozaki², Takafumi Nakagawa²
¹JAXA, Japan, ²Mitsubishi Electric Corporation, Kamakura Works, Japan

Current Collection Experiment of Bare Electrodynamc Tether Using Sounding Rocket
### [c-1] Material Characterization in Space Environment

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<tr>
<td>Chairpersons</td>
<td>Junichiro Ishizawa (JAXA, Japan) Minoru Iwata (Kyushu Institute of Technology, Japan)</td>
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#### 2009-c-01 ( 9:00-9:20 )

**Erosion Properties of PMDA–ODA Polyimide as a Reference Material for Atomic Oxygen Fluence Monitoring**

Kumiko Yokota, Masahito Tagawa

*Kobe University, Japan*

#### 2009-c-02 ( 9:20-9:40 )

**Energy Dependence on Fluorinated Polymer Erosion by Hyperthermal Atomic Oxygen Exposures: a High-speed Chopper and Quartz Crystal Microbalance Study**

Kazuhiro Kishida\(^1\), Kumiko Yokota\(^1\), Akio Okamoto\(^2\), Masahito Tagawa\(^1\)

\(^1\)Kobe University, Japan, \(^2\)Technology Research Institute of Osaka Prefecture, Japan

#### 2009-c-03 ( 9:40-10:00 )

**Generation of LEO-type Atomic Oxygen Environment in Laboratory for Charging Property Database**

Noor Mundari, Chiga Masaru, Teppei Okumura, A Khan, Hirokazu Masui, Minoru Iwata, Kazuhiro Toyoda, Mengu Cho

*Kyushu Institute of Technology, Japan*

#### 2009-c-04 ( 10:00-10:20 )

**Effect of Exposure Test on Transmittance of TiO2-coated Substrates and Molecular Contaminants**
### Composite Structures

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</table>
| Chairpersons       | Rameshchandra Shimpi (Indian Institute of Technology – Bombay, India)  
                    | Yoji Okabe (The University of Tokyo, Japan) |

#### 2009–c-11 (11:30–11:50)

**Evaluation of Gas Permeability of CFRP Laminates under Cyclic Loadings**

Tomohiro Yokozeki\(^1\), Akiko Kuroda\(^1\), Akinori Yoshimura\(^2\), Toshio Ogasawara\(^2\), Takahira Aoki\(^1\)

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

#### 2009–c-12 (11:50–12:10)

**Evaluation of Interfacial Fracture Toughness of CFRP Adhesive Bonded Structure at Cryogenic Temperature**

Akinori Yoshimura\(^1\), Yohei Noji\(^2\), Tomohiro Takaki\(^2\), Tomohiro Yokozeki\(^3\), Toshio Ogasawara\(^1\), Shinji Ogihara\(^2\)

\(^1\)University of Tokyo, Japan, \(^2\)JAXA, Japan, \(^3\)Nagasaki University, Japan
### Health Monitoring and High Temperature Materials

#### Session Date: 2009/7/7 14:00 - 15:20
#### Room: Room 303
#### Chairpersons: Luigi Scatteia (CIRA – Italian Aerospace Research Centre, Italy) Toshio Ogasawara (JAXA, Japan)

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<td>2009-c-13 (14:00-14:20)</td>
<td>Delamination Detection in CFRP Quasi-isotropic Laminates Using the Dispersion Characteristic of Broadband Lamb Waves</td>
<td>Yoji Okabe, Keiji Fujibayashi (The University of Tokyo, Japan)</td>
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<td>2009-c-09 (14:20-14:40)</td>
<td>Health Monitoring of C/C-SiC Structures by Measuring their Electrical Resistance</td>
<td>Arianit Preci¹, Georg Herdrich¹, Markus Fertig¹, Wolfgang Fischer², Uwe Gratzel², Monika Auweter-Kurtz³</td>
</tr>
<tr>
<td>¹Universitaet Stuttgart, Germany, ²EADS Astrium ST Bremen, Germany, ³Universitaet Hamburg, Germany</td>
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<td>2009-c-10 (14:40-15:00)</td>
<td>Development of Combustion Chamber Outer Case by Superplastic Blow Forming</td>
<td>Yeong-Moo Yi, Jong-Hoon Yoon, Ho-Sung Lee (Korea Aerospace Research Institute, Korea)</td>
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<td>2009-c-08 (15:00-15:20)</td>
<td>Ultra High Temperatures Ceramics for Hot Structures: Lesson Learned And Future Perspectives</td>
<td>Luigi Scatteia, Davide Alfano, S. Cantoni, Roberto Gardi, Giuliano Marino (CIRA – Italian Aerospace Research Centre, Italy)</td>
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<td>Session Date</td>
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<tr>
<td>Room</td>
<td>Room 303</td>
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</table>
| Chairpersons     | Tomohiro Yokozeki (The University of Tokyo, Japan)  
Toshio Ogasawara (JAXA, Japan) |

*The last letter “s” in the program number is the presentation(s) from Student Session.*

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<td>15:30</td>
<td>Structure Optimization of Mach 5 Class Hypersonic Airplane</td>
<td>Hideaki Sato</td>
<td>Waseda University, Japan</td>
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<td>15:50</td>
<td>Improvement of Gas Barrier Properties of CFRP Laminates by Using Thin-ply Prepregs</td>
<td>Tomohiro Takaki</td>
<td>Tokyo University of Science, Japan</td>
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<td>16:10</td>
<td>Evaluation of Uncertainty in Radiation Heating Experiment of Advanced Stand-off Thermal Protection System</td>
<td>Takehiro Ishii</td>
<td>Waseda University, Japan</td>
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<td>16:30</td>
<td>Low-Cost Molding Method of Carbon Fiber Reinforced Polycarbonates</td>
<td>Takuto Sakai</td>
<td>Waseda University, Japan</td>
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<td>16:50</td>
<td>Identification of Gravity Effect on the Deployable Structure of PRISM by Micro Gravity Experiments</td>
<td>Il Yun Yoo</td>
<td>University of Tokyo, Japan</td>
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<td>17:10</td>
<td>Prediction Methods of Wrinkling in Thin-Membrane</td>
<td>Shoko Inoue</td>
<td>Nihon University, Japan</td>
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[c-5] Structural Dynamics of Spacecraft

Session Date : 2009/7/8 9:00 – 10:40
Room : Room 303
Chairpersons : Yasuyuki Miyazaki (Nihon University, Japan)
Hiraku Sakamoto (Tokyo Institute of Technology, Japan)

2009-c-21 ( 9:00-9:20 )
A Preliminary Experiment of Self-powered Smart Semi-active Vibration Suppression
Shinsuke Takeuchi, Junjiro Onoda, Kenji Minesugi, Shigeru Shimose
JAXA, Japan

2009-c-23 ( 9:20-9:40 )
Frequency Estimation Method for Measuring Mass under Microgravity Conditions
Koichi Maru\(^1\), Yusaku Fujii\(^1\), Jan Hessling\(^2\), Kazuhito Shimada\(^3\)
\(^1\)Gunma University, Japan, \(^2\)SP Technical Research Institute of Sweden Measurement Technology, Sweden, \(^3\)JAXA, Japan

2009-c-24 ( 9:40-10:00 )
Tuned Mass Damper for Gossamer Structure
Yohsuke Nambu\(^1\), Junjiro Onoda\(^2\)
\(^1\)University of Tokyo, Japan, \(^2\)ISAS/JAXA, Japan

2009-c-25 ( 10:00-10:20 )
Separation Nano-Camera Probe System for Inspecting Large Space Structure
Shinichi Inagawa\(^1\), Saburo Matunaga\(^1\), Shinichi Kimura\(^2\), Hirotaka Sawada\(^3\)
\(^1\)Tokyo Institute of Technology, Japan, \(^2\)Tokyo University of Science, Japan, \(^3\)JAXA, Japan

2009-c-26 ( 10:20-10:40 )
Structural Design of UNITEC-1
Shunsuke Onishi\(^1\), Keiichi Okuyama\(^2\)
\(^1\)Kyushu University, Japan, \(^2\)Tsuyama National College of Technology, Japan

[c-6] Deployable Structures

Session Date : 2009/7/9 9:00 – 10:40
Room : Room 202B
Applying an Extendable Tensegrity Structure to the Space Missions

Yusuke Hagiwara\textsuperscript{1}, Mitsushige Oda\textsuperscript{2}

\textsuperscript{1}Tokyo Institute of Technology, Japan, \textsuperscript{2}JAXA, Japan

Improved Morphable Beam Device for Equipping Camera at Beam End

Shintaro Mizunuma, Saburo Matunaga, Nobuhiko Kisa

Tokyo Institute of Technology, Japan

Deployable Rhombic Dodecahedral Modules Consisting of Struts and Cables

Hiroaki Tanaka

National Defense Academy of Japan, Japan

Folding Properties of Two-dimensional Deployable Membrane Using FEM Analyses

Yasutaka Satou, Hiroshi Furuya

Tokyo Institute of Technology, Japan

Experiments of Electro Dynamic Tether System Using Bare Tape Tether and Development of the Tape Tether Deployer

Takeo Watanabe\textsuperscript{1}, Hironori Fujii\textsuperscript{2}, Tomoya Mazawa\textsuperscript{1}, Masahiro Sukekawa\textsuperscript{1}, Hirohisa Kojima\textsuperscript{1}, Hironori Sahara\textsuperscript{1}

\textsuperscript{1}Tokyo Metropolitan University, Japan, \textsuperscript{2}Kanagawa Institute of Technology, Japan

Finite Element Dynamic Analysis of Solar Sail Deployment

[c-7] Membrane Structures

Session Date : 2009/7/9 10:50 - 11:50
Room : Room 202B
Chairpersons : Ken Higuchi (JAXA, Japan)
Hiroaki Tanaka (National Defense Academy of Japan, Japan)
### Mission Design and Orbit Control (1)

**Session Date:** 2009/7/7 9:00 – 10:20  
**Room:** Room 201A/B  
**Chairpersons:** Lin Liu (Nanjing University, China)  
Yasuhiro Kawakatsu (ISAS, JAXA, Japan)

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| 2009–d-01  | Orbital Design for Multiple Flyby Mission                                                                | Mai Bando, Hiroshi Yamakawa  
Kyoto University, Japan                                    |
| 2009–d-02  | Optimal Preliminary Design of Low-thrust Trajectories through Two Novel Shaping Approaches              | Massimiliano Vasile, Daniel Nivak  
University of Glasgow, UK                                     |
| 2009–d-03  | Global Optimization of Low-Thrust Trajectories via Impulsive Delta-V Transcription                      | Chit Hong Yam, Francesco Biscani, Dario Izzo  
ESTEC, European Space Agency, The Netherlands               |
| 2009–d-04  | Inclination Maneuver and Frozen Orbit Keeping of the Advanced Land Observing Satellite (ALOS)           |                                                          |
[d-2] Attitude and Orbit Control Systems

Session Date: 2009/7/7 10:30 - 12:10
Room: Room 201A/B
Chairpersons: Jozef van der Ha (Kyushu University, Japan)
Takanori Iwata (JAXA, Japan)

2009-d-05 (10:30-10:50)

Attitude Determination and Control System in Pico-satellite for Remote-sensing and Innovative Space Missions (PRISM)

Takaya Inamori¹, Ilyun Yoo¹, Yuta Suzaki², Yuki Sato¹, Toshiki Tanaka¹, Mitsuhito Komatsu¹, Shinti Nakasuka¹

¹University of Tokyo, Japan, ²Tokyo Denki University, Japan

2009-d-06 (10:50-11:10)

Operation and Evaluation Results of KAGUYA Attitude and Orbit Control System on Lunar Orbit

Shuichi Matsumoto¹, Satoshi Tayama¹, Yoshihiro Iwamoto², Keita Ogo², Kazuhisa Tanaka², Yosuke Iwayama²

¹JAXA, Japan, ²NEC TOSHIBA Space Systems, Japan

2009-d-07 (11:10-11:30)

Overview on Attitude and Orbit Control System (AOCS) of PLANET-C: Venus Climate Orbiter Mission

Shinichiro Narita¹, Yasuhiro Kawakatsu¹, Toshihiro Kurii², Takeshi Yoshizawa², Nobuaki Ishii¹, Masato Nakamura¹

¹JAXA, Japan, ²NEC TOSHIBA Space Systems, Japan

2009-d-08 (11:30-11:50)

A Power Positive Parking Attitude Mode with a Fault-Tolerant Magnetic Spin Stabilizing Controller for the JC2Sat Mission

James Lee¹, Anton de Ruiter², Marleen van Mierlo¹, Sudarshan Martins¹, Alfred Ng¹, Keisuke Yoshihara³

¹Canadian Space Agency, Canada, ²Carleton University, Canada, ³JAXA, Japan

2009-d-09 (11:50-12:10)
The Magnetism Management of "Nano-JASMINE"
Toshiki Tanaka, Takaya Inamori, Nobutada Sako, Shinichi Nakasuka
University of Tokyo, Japan

[d-3] Attitude and Dynamics Estimation

Session Date : 2009/7/7 14:00 – 15:40
Room : Room 201A/B
Chairpersons : Ken Maeda (NEC, Japan)
               Shoji Yoshikawa (Mitsubishi Electric, Japan)

2009-d-10 (14:00-14:20)
Vision-Based Estimation for Thermally Induced Dynamics of Solar Array Paddle
Takanori Iwata
JAXA, Japan

2009-d-11 (14:20-14:40)
Observation of the “Thermal Snap” of a Solar Array Panel of a Low Earth Orbiting Satellite Using the GOSAT Satellite
Mitsushige Oda, Satoshi Suzuki, Yusuke Hagiwara, Toshiyuki Nakamura, Noriyasu Inaba, Kazuya Konoue, Hirotaka Sawada
1JAXA, Japan, 2AES, Japan, 3Tokyo Tech, Japan

2009-d-12 (14:40-15:00)
Model for Determination of Spin-axis Attitude and its Covariances
Jozef van der Ha
University of Kyushu, Japan

2009-d-13 (15:00-15:20)
Attitude Estimation Using Star Images in Nano-JASMINE Mission
Takaya Inamori
University of Tokyo, Japan

2009-d-14 (15:20-15:40)
Nano-Satellite Attitude Estimation Using a Low Cost Star Tracker
Casey Lambert, Shinichi Nakasuka
University of Tokyo, Japan

**Session Date:** 2009/7/7 15:50 – 16:50  
**Room:** Room 201A/B  
**Chairpersons:** Seiya Ueno (Yokohama National University, Japan)  
Ken Maeda (NEC, Japan)

#### 2009-d-15 (15:50-16:10)

**Design of Multi-sensor Attitude Determination System for Balloon-based Operation Vehicle**

Shigehito Shimizu¹, Peter Buist², Nobutaka Bando¹, Shin-ichiro Sakai¹, Shujiro Sawai¹, Tatsuaki Hashimoto¹  
¹JAXA, Japan, ²Delft University of Technology, the Netherlands

#### 2009-d-16 (16:10-16:30)

**In-Flight Measurements of Accelerations of Flapping UAV during Maneuver**

Joji Goto, Koju Hiraki, Takayuki Imoto, Masanobu Inoue  
*Kyushu Institute of Technology, Japan*

#### 2009-d-17 (16:30-16:50)

**Nonlinear Adaptive Control System for Re-entry Vehicle**

Akio Abe, Yozo Shimada, Kenji Uchiyama  
*Nihon University, Japan*

### [d-5-s] Attitude and Flight Path Control

**Session Date:** 2009/7/7 17:00 – 18:00  
**Room:** Room 201A/B  
**Chairpersons:** Katsuhiko Yamada (Nagoya University, Japan)  
Hirohisa Kojima (Tokyo Metropolitan University, Japan)  
*The last letter “s” in the program number is the presentation(s) from Student Session.*

#### 2009-d-18s (17:00-17:20)

**Nonlinear Adaptive Flight Control System for Space Plane based on Immersion and Invariance**

Yuta Kobayashi  
*Keio University, Japan*

#### 2009-d-19s (17:20-17:40)

**Attitude Control of Hayabusa Using an Ion Thruster for the Case of RWs Anomaly**

Shogo Sato
# Study on Optimal Control of Periodic Maneuvers of Satellites with CMGs

**Takuya Ohmura**  
*Yokohama National University, Japan*

## [d-6] Attitude Maneuver (1)

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| Chairpersons   | Takanori Iwata (JAXA, Japan)  
Fuyuto Terui (JSPEC, JAXA, Japan) |

### 2009-d-21 (9:00–9:20)

**Robust Motion Planning for Flexible Spacecraft under Multiple Constraints**

**Takehiro Nishiyama**<sup>1</sup>, **Katsuhiko Yamada**<sup>2</sup>, **Shoji Yoshikawa**<sup>1</sup>

<sup>1</sup>*Mitsubishi Electric Corporation, Japan, 2*Nagoya University, Japan*

### 2009-d-22 (9:20–9:40)

**Position and Attitude Control of a Free-Floating Planar Satellite Controlled by Thrusters**

**Shinji Hokamoto**, **Masaoki Iwase**  
*Kyushu University, Japan*

### 2009-d-23 (9:40–10:00)

**High-Speed Attitude Control System for Small Satellite with Micro-CMGs**

**Kyohei Akiyama**, **Kota Fujihashi**, **Saburo Matunaga**  
*Tokyo Institute of Technology, Japan*

### 2009-d-24 (10:00–10:20)

**Development of CMG for Three-Axes Free Air Floating Dynamics Simulator**

**Takuya Kanzawa**<sup>1</sup>, **Tatsuya Endo**<sup>1</sup>, **Hiroshi Kawai**<sup>1</sup>, **Ken Fujiwara**<sup>1</sup>, **Yasuhiro Kakehashi**<sup>1</sup>, **Takeshi Fukuyama**<sup>2</sup>, **Naoki Sasaki**<sup>2</sup>

<sup>1 JAXA, Japan, 2*Advanced Engineering Services, Japan*

### 2009-d-25 (10:20–10:40)

**Automatic Balancing for a Three-Axis Spacecraft Simulator**
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| Chairpersons  | Fuyuto Terui (JSPEC, JAXA, Japan)  
|               | Shin-ichiro Sakai (ISAS, JAXA, Japan) |

**2009-d-26 (10:50-11:10)**

**A New Control Scheme for Satellite Formation Reconfiguration**

Ji Wang, Jin Zhang, Xi Cao, Feng Wang  
*Harbin Institute of Technology, China*

**2009-d-27 (11:10-11:30)**

**Series Expansion Form of an Approximate State Transition Matrix for Fully Perturbed Orbits**

Yuichi Tsuda$^1$, Daniel Scheeres$^2$  
$^1$JAXA, Japan, $^2$University of Colorado at Boulder, USA

**2009-d-28 (11:30-11:50)**

**Analysis of Disturbance Effects on Relative Position of Circular Formation**

Katsuhiko Yamada$^1$, Takeya Shima$^2$, Shoji Yoshikawa$^2$  
$^1$Nagoya University, Japan, $^2$Mitsubishi Electric Corporation, Japan

**2009-d-29 (11:50-12:10)**

**Comparison of Relative Position Control for Precise Formation Flying**

Shoji Yoshikawa$^1$, Takeya Shima$^1$, Katsuhiko Yamada$^2$  
$^1$Mitsubishi Electric Corporation, Japan, $^2$Nagoya University, Japan

**2009-d-30 (12:10-12:30)**

**Spacecraft Formation Dynamics under the Influence of Geomagnetic Lorentz Force**

Hiroshi Yamakawa, Katsuyuki Yano, Mai Bando  
*Kyoto University, Japan*
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<td>Makoto Yoshikawa (ISAS, JAXA, Japan)</td>
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### 2009-d-31 (9:00–9:20)

**Orbit Determination and Gravity Estimation Results of KAGUYA: from Nominal Observation Phase to Extended Mission Phase**

Hitoshi Ikeda\(^1\), Mina Ogawa\(^1\), Masao Hirota\(^1\), Shigehiro Mori\(^1\), Chiaki Aoshima\(^2\), Takafumi Ohnishi\(^2\), Shiro Ishibashi\(^2\), Hirotomo Noda\(^3\), Yoshiaki Ishihara\(^3\), Takahiro Iwata\(^1\), Noriyuki Namiki\(^4\)

\(^1\)JAXA, Japan, \(^2\)Fujitsu, Ltd., Japan, \(^3\)National Astronomical Observatory of Japan, Japan, \(^4\)Kyushu University, Japan

### 2009-d-32 (9:20–9:40)

**Studies on 4-way Doppler and Differential VLBI Techniques of Kaguya (SELENE) for Detecting Lunar Gravity Field**

Qinghui Liu\(^1\), Fuyuhiko Kikuchi\(^1\), Koji Matsumoto\(^1\), Sander Goossens\(^1\), Hideo Hanada\(^1\), Takahiro Iwata\(^2\), Noriyuki Namiki\(^3\), Hirotomo Noda\(^1\), Yoshiaki Ishihara\(^1\), Kazuyoshi Asari\(^1\)

\(^1\)National Astronomical Observatory, Japan, \(^2\)JAXA, Japan, \(^3\)Kyushu University, Japan

### 2009-d-33 (9:40–10:00)

**Circular and Zero-inclination Solutions for Optical Observations of Earth-orbiting Objects**

Kohei Fujimoto\(^1\), Jared Maruskin\(^2\), Daniel Scheeres\(^3\)

\(^1\)The University of Michigan, USA, \(^2\)San Jose State University, USA, \(^3\)The University of Colorado at Boulder, USA

### 2009-d-34 (10:00–10:20)

**The Angular Position Estimation of the Moving Spacecraft Using Tracking Stations**

Tsutomu Ichikawa

JAXA Space Exploration Center (JSPEC)/Institute of Space and Astroanautical Sience (ISAS), Japan

### 2009-d-35 (10:20–10:40)

**Overview of Precise Orbit and Clock Estimation for Quasi-Zenith Satellite System and Simulation Results**

Nobuhiro Kajiwara\(^1\), Yousuke Yamamoto\(^1\), Mikio Sawabe\(^2\), Satoshi Kogure\(^2\), Takashi Tsuruta\(^2\), Motohisa Kishimoto\(^2\), Yoshiiisa Kawaguchi\(^3\), Tomoya Shibata\(^3\)

\(^1\)Fujitsu Limited, Japan, \(^2\)JAXA, Japan, \(^3\)NEC Corporation, Japan
Demonstration of Solar Sail Deployment System Using a High Altitude Balloon

Yoji Shirasawa¹, Osamu Mori², Hirotaka Sawada², Tsuguo Imaizumi³, Yuya Mimasu⁴, Shogo Sato¹, Keita Tanaka¹, Norizumi Motooka¹, Marie Kitajima⁵, Jun’ichiro Kawaguchi²

¹University of Tokyo, Japan, ²JAXA, Japan, ³The University of Electro-Communications, Japan, ⁴Kyushu University, Japan, ⁵Tokai University, Japan

Oscillation-Free Attitude Control of Spinning Solar Sail with Huge Flexible Membrane

Ryu Funase¹, Masayuki Sugita², Yuichi Miwa³, Osamu Mori¹, Junichiro Kawaguchi¹

¹JAXA, Japan, ²Aoyama Gakuin University, Japan, ³The University of Tokyo, Japan

Tether Tension of Tape Tether on a Sounding Rocket Experiment

Kohtaro Honda¹, Hironori Fujii¹, Takahiro Yamada¹, Takafumi Hirao¹, Yu-ki Yamagishi¹, Takahiro Aizawa¹, Masaya Ura¹, Kentaro Kainose¹, Hirotoshi Mizuno¹, Takeo Watanabe², Williams Paul³

¹Kanagawa Institute of Technology, Japan, ²Tokyo Metropolitan University, Japan, ³Delft University of Technology, the Netherlands

Experimental Verification of Chaotic Librational Motion of Tethered Satellite System

Yoshiyasu Fukukawa, Hirohisa Kojima

Tokyo Metropolitan University, Japan

Switching Delayed Feedback Control of Electrodynamic Tether System in Elliptic Orbit

Hirohisa Kojima¹, Tetsuro Sugimoto²

¹Tokyo Metropolitan University, Japan, ²JSAT Co. LTD., Japan
**Formation Flight and Proximity Operations (2)**

**Session Date:** 2009/7/9 14:00 – 15:40  
**Room:** Room 201A/B  
**Chairpersons:** Hiroshi Yamakawa (Kyoto University, Japan)  
Takanori Iwata (JAXA, Japan)

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**2009-d-41 (14:00-14:20)**

**SIMBOLX: a Formation Flying X-ray Mission on HEO**

Philippe Gamet¹, Angelique Gaudel¹, Jean-Claude Berges¹, Richard Epenoy¹, Frederic Renaud², David Pascal¹, Sophie Djalal¹, Nelly Rey¹

¹CNES, France, ²THALES SERVICES, France

---

**2009-d-42 (14:20-14:40)**

**FFAST : Formation Flight All Sky Telescope, Formation Flight System Analyses and Design**

Shinji Mitani¹, Toru Yamamoto¹, Isao Kawano¹, Shin-ichiro Sakai¹, Hiroshi Tsunemi², FFAST team

¹JAXA, Japan, ²Osaka University, Japan

---

**2009-d-43 (14:40-15:00)**

**Tridimensional Multi Formation Flight Satellite TETRA**

Yoshiyuki Miura, Raguna Kuga, Shinichi Inagawa, Manabu Kawakubo, Shintaro Mizunuma, Kyouhei Akiyama

Tokyo Institute of Technology, Japan

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**2009-d-44 (15:00-15:20)**

**Design and Performance Analysis of GPS Based Precise Relative Navigation for Rendezvous and Formation Flying Missions in Low Earth Orbit**

Toru Yamamoto

JAXA, Japan

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**2009-d-46 (15:20-15:40)**

**The Robot Hand for the Astrobot: A Dexterous, Powerful, Robot Hand for Space**

Taihei Ueno¹, Mitsushige Oda²

¹Tokyo Institute of Technology, Japan, ²JAXA, Japan

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**Attitude Maneuver (2)**

**Session Date:** 2009/7/9 16:10 – 17:50  
**Room:** Room 201A/B

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Analysis and Suppression of Limit Cycle Oscillation Induced by CMG Gimbal Friction
Yuta Fujii, Katsuhiko Yamada, Takeya Shima
1 Mitsubishi Electric Corporation, Japan, 2 Nagoya University, Japan

Spacecraft Attitude Control Using a Double-Gimbal Control Moment Gyro
Naoki Takatsuka, Katsuhiko Yamada, Ichiro Jikuya
Nagoya University, Japan

CMG Singularity Avoidance Steering Control Based on Singular Surface Cost Function
Kohei Takada, Hirohisa Kojima, Naoki Matsuda
Tokyo Metropolitan University, Japan

Adaptive Skewing Pyramid Type CMGs for Fast Attitude Maneuver
Naoki Matsuda, Hirohisa Kojima, Kohei Takada
Tokyo Metropolitan University, Japan

Pointing Control of Spacecraft Using Two Single-Gimbal Control Moment Gyros
Hiroshi Okubo, Sangwon Kwon
Osaka Prefecture University, Japan

Design Methodologies for High Reliable System Implemented on SRAM-based FPGAs for Spacecraft Guidance and Control

Session Date: 2009/7/10 9:00 - 10:20
Room: Room 201A/B
Chairpersons: Hiroshi Yamakawa (Kyoto University, Japan) Takanori Iwata (JAXA, Japan)

*The last letter “s” in the program number is the presentation(s) from Student Session.
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<td>Zhigang Hao</td>
<td>China Academy of Space Technology (CAST), China</td>
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<td>2009-d-54s</td>
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<td>Window Expansion for Re-encounter with the Moon Using the Weak Stability Boundary Transfer with the Low Thrust Propulsion</td>
<td>Nugraha Arifianto</td>
<td>Institut Teknologi Bandung, Indonesia</td>
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<td>High Precision Orbital Propagation of Nanosatellites Using NORAD TLE, SGP4 and GPS</td>
<td>Keita Tanaka</td>
<td>University of Tokyo, Japan</td>
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<td>Yasuhiro Kawakatsu, Hitoshi Kuninaka, Kazutaka Nishiyama</td>
<td>JAXA, Japan</td>
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<td>2009-d-57</td>
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<td>A Study of Earth–Mars Transportation System Using Earth and Mars Halo Orbits</td>
<td>Masaki Nakamiya, Daniel Scheeres, Hiroshi Yamakawa, Makoto Yoshikawa</td>
<td>The Graduate University for Advanced Studies, Japan, University of Colorado at Boulder, USA, Kyoto University, Japan, JAXA, Japan</td>
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Constellation of Two Orbiters around Mars
Naoko Ogawa, Mutsuko Morimoto, Yasuhiro Kawakatsu, Jun’ichiro Kawaguchi
JAXA, Japan

2009-d-59 (11:30-11:50)

Trajectory Analysis of Small Solar Sail Demonstration Spacecraft Ikaros Considering the Uncertainty of Solar Radiation Pressure
Tomohiro Yamaguchi¹, Mutsuko Morimoto², Hiroshi Takeuchi², Makoto Yoshikawa², Yuya Mimasu³, Yuichi Tsuda², Ryu Funase², Hirotaka Sawada², Osamu Mori²
¹The Graduate University of Advanced Studies, Japan, ²JAXA, Japan, ³Kyushu University, Japan

2009-d-60 (11:50-12:10)

On Utilization of Solar Sails in Triangular Libration Point Missions in the Earth-Moon System
Xiyun Hou, Jingshi Tang, Lin Liu
Nanjing University, China

2009-d-61 (14:00-14:20)

Development of Pulse Detection IC for Space LIDAR
Kousuke Kawahara, Hirokazu Ikeda, Takahide Mizuno
JAXA, Japan

2009-d-62 (14:20-14:40)

Rapid Prototyping of a Sensor for Planetary Descent Landings
Christopher Boshuizen¹, Tomas Svitek², Eleanor Crane³, Douglas Forman⁴
¹NASA Ames Research Center, USA, ²Stellar Exploration Inc., ³Stanford University, USA, ⁴MEI Company, USA

2009-d-64 (14:40-15:00)

GPS Receiver Design for Spin-Stabilized Launch Vehicles
Takuji Ebinuma¹, Hirobumi Saito², Koji Tanaka²
[e-1] Thermal Protection System

Session Date : 2009/7/9 14:00 – 15:40
Room : Room 405
Chairpersons : Hirotaka Otsu (Ryukoku University, Japan)
Kojiro Suzuki (The University of Tokyo, Japan)

2009-e-01 ( 14:00-14:20 )

Numerical Analysis of Rarefied Oxygen Flow Around Catalytic Materials

Toshiyuki Suzuki¹, Kazuhisa Fujita¹, Hiroshi Osawa², Keisuke Sawada²
¹JAXA, Japan, ²Tohoku University, Japan

2009-e-02 ( 14:20-14:40 )

Catalytic Efficiency of Atomic Oxygen Recombination for SiC Deduced with Laser Absorption Spectroscopy

Hiroki Takayanagi¹, Carola Bauer², Hiroshi Osawa³, Toshiyuki Suzuki¹, Kazuhisa Fujita¹, Kimiya Komurasaki⁴
¹JAXA, Japan, ²Stuttgart University, Germany, ³Tohoku University, Japan, ⁴The University of Tokyo, Japan

2009-e-03 ( 14:40-15:00 )

Development of High and Low Density Ablators for DASH-II, and Future Reentry Missions

Tetsuya Yamada
ISAS/JAXA, Japan

2009-e-04 ( 15:00-15:20 )

Experimental Study of Ablation Processes of SiC-based Materials in Air Plasma Freejets

Masato Funatsu, Masahiro Ozawa, Hiroyuki Shirai, Fumio Takakusagi
Gunma University, Japan

2009-e-05 ( 15:20-15:40 )

Numerical Investigation of Spalled Particle Behavior Ejected from an Ablator Surface

Sohey Nozawa, Hisashi Kihara, Ken-ichi Abe
Kyushu University, Japan
### Fluid Dynamics and Aerothermodynamics

**Session Date:** 2009/7/9 15:50 – 18:10  
**Room:** Room 405  
**Chairpersons:** Takeharu Sakai (Nagoya University, Japan)  
Toshiyuki Suzuki (JAXA, Japan)

*The last letter “s” in the program number is the presentation(s) from Student Session.*

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<td>Katsuya Shimizu</td>
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<td>Masami Tomita</td>
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<td>M.Rizal Rosli</td>
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<td>Yasumasa Watanabe</td>
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<td>Hiroshi Osawa</td>
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<td>Shock-Tube Study of Shock Layer Radiation Analysis</td>
<td>Gouji Yamada</td>
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Measurement of Emission Spectral Profile in Carbon Dioxide Arcjet Flow

Hayato Goto
Aichi Institute of Technology, Japan

[S-3] Plasma Flows

Session Date: 2009/7/10 9:00 – 10:40
Room: Room 406
Chairpersons: Hiroki Nagai (Tohoku University, Japan) Masato Funatsu (Gunma University, Japan)

2009-e-13 (9:00–9:20)

Spectroscopic Observation of Translational-Rotational Relaxation in Hydrogen Plasma Flow

Yoshiki Takama, Kojiro Suzuki
The University of Tokyo, Japan

2009-e-14 (9:20–9:40)

Effect of Surface Wave Plasma on Wetting Characteristics of Material Surface

Takuya Katsuda¹, Hiromitsu Kawazoe¹, Takashi Matsuno¹, Shin Takeuchi², Tatsuya Takehisa²
¹University of Tottori, Japan, ²Nissin Inc.

2009-e-15 (9:40–10:00)

Combined Laser Absorption Spectroscopy and Laser Induced Fluorescence in High Enthalpy Flow

Satoshi Nomura¹, Stefan Loehle², Andreas Knapp², Georg Herdrich², Kimiya Komurasaki¹
¹The University of Tokyo, Japan, ²University of Stuttgart, Germany

2009-e-16 (10:00–10:20)

Stabilization Control of the Inductively Coupled Plasma Generator for Venus Entry Simulation

Akira Yumiyama¹, Florian Buechs², Testuya Yamada³, Masahisa Yanagisawa¹
¹The University of Electro-Communications, Japan, ²The University of Stuttgart, Germany, ³JAXA, Japan

2009-e-17 (10:20–10:40)
The Measurement Technique of Nitrogen Vibrational and Rotational Temperatures behind Hypervelocity Shock Wave Over the Mach Number of 15 with CARS

Takashi Osada, Youichi Endo, Chikara Kanazawa, Masanori Ota, Kazuo Maeno
Chiba University, Japan

[e-4] Vehicle Aerodynamics

Session Date : 2009/7/10 10:50 – 12:10
Room : Room 406
Chairpersons : Hisashi Kihara (Kyushu University, Japan)
Kazuhisa Fujita (JAXA, Japan)

2009-e-18  (10:50-11:10)
Simultaneous Optimization of Flight Control and Aerodynamic Shape for Aerocapture Vehicle

Naohiko Honma, Kojiro Suzuki
The University of Tokyo, Japan

2009-e-19  (11:10-11:30)
Wind Tunnel Experiments of the Reentry Vehicle System with the Trailing Toroidal Ballute

Hirotaka Otsu
Ryukoku University, Japan

2009-e-20  (11:30-11:50)
Hypersonic Wind Tunnel Test of Flare-type Membrane Aeroshell for Atmospheric-entry Capsule

Kazuhiko Yamada¹, Masashi Koyama², Yusuke Kimura³, Kojiro Suzuki², Takashi Abe¹, Koichi Hayashi³
¹JAXA, Japan, ²The University of Tokyo, Japan, ³Aoyama Gakuin University, Japan

2009-e-21  (11:50-12:10)
Three Dimensional Effect of a Supersonic Busemann Biplane on Start Process

Hiroki Nagai, Soshi Oyama, Keisuke Asai, Takashi Fujizono, Shigeru Obayashi
Tohoku University, Japan

[e-5] Fluid Dynamics (1)

Session Date : 2009/7/10 14:20 – 16:20
Room : Room 406
Effect of Level of over Expansion in a Suddenly Expanded Flow for Area Ratio 6.25
Sher Khan¹, Ahmed Baig¹, Zakir Ilahi², Ethirajan Rathakrishnan³
¹P A College of Engg, Mangalore, India, ²Saboo Siddik College of Engg, India, ³I I T, Kanpur, U P, India

Flow in Slanted Entry Supersonic Nozzle Run by a Supersonic Free Jet
Ethirajan Rathakrishnan¹, S Elangovan², C Senthilkumar²
¹I I T, Kanpur, India, ²MIT, Anna University, India

Parameter Design of Plasma Actuator for the Separation Control of a Cylinder Wake
Kentaro Ota, Takashi Kanatani, Takashi Matsuno, Hiroshi Iwata, Hiromitsu Kawazoe
University of Tottori, Japan

Investigation of Three-Dimensional Unsteady Flow Characteristics in Transonic Diffusers
Dzianis Proshchanka, Koichi Yonezawa, Yoshinobu Tsujimoto
Osaka University, Japan

Multi-component Force Measurement with Miniature Accelerometer in the Free-piston Shock Tunnel HIEST
Hideyuki Tanno, Tomoyuki Komuro, Masatoshi Kadera, Kazuo Sato, Masahiro Takahashi, Katsuhiro Itoh
JAXA, Japan

Surface Heat Flux Visualization on a Blunt–nosed Body with an Aerospike in Hypersonic Flow Using Temperature-Sensitive Paint
Hiroki Nagai¹, Seungwon Ha¹, Keisuke Asai¹, Nobuyuki Tsuboi², Kazuyoshi Nakakita²
¹Tohoku University, Japan, ²JAXA, Japan
Session Date: 2009/7/10 16:30 – 18:10  
Room: Room 406  
Chairpersons: Hiromitsu Kawazoe (Tottori University, Japan)  
Hideyuki Tanno (JAXA, Japan)

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<td><strong>Control of Suddenly Expanded Flows With Rib</strong></td>
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<td>Ethirajan Rathakrishnan¹, S Elangovan², K Vijayaraja³</td>
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<td>¹IIT Kanpur, India, ²MIT, Anna University, India, ³P.B. College of Engineering, India</td>
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[Design, Test and Operation]

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Room: Room 405  
Chairpersons: Tomoaki Toda (JAXA, Japan)  
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*CNES (French Space Agency), France*

2009–f–02 (10:50–11:10)

**Thermal Design of GCOM-W1 Satellite**  
*Takamasa Itahashi, Masaaki Mokuno, Keizo Nakagawa*  
*JAXA, Japan*

2009–f–03 (11:10–11:30)

**Dynamic Correlation of KIBO’s Structural Math Model**  
*Takayuki Shimoda, Shigeru Imai, Masaru Wada*  
*JAXA, Japan*

2009–f–04 (11:30–11:50)

**Lunar Surface Equipment Testing and Demonstrations at the PISCES Lunar Analog Facilities**  
*Robert Carlson¹, Dan Bland¹, Robert Fox², John Hamilton², Frank Schowengerdt²*  
¹JAMSS America, Inc., USA, ²University of Hawai’i at Hilo / Pacific International Space Center for Exploration Systems, USA

2009–f–05 (11:50–12:10)

**JEM TCS/ECLSS Operation and Lessons Learned**  
*Yuichiro Nogawa¹, Junichi Yamaguchi², Miki Hirai²*  
¹Japan Manned Space Systems Corporation, Japan, ²JAXA, Japan

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[**f–2**] **Small Satellite (1)**

**Session Date**: 2009/7/10 14:20 – 15:40  
**Room**: Room 405  
**Chairpersons**: Toshiaki Ogawa (NEC, Japan), Seisuke Fukuda (JAXA, Japan)

2009–f–06 (14:20–14:40)

**UNITEC-1 and Onboard Computer Survival Competition in Interplanetary Environment**  
*Shinichi Nakasuka*  
*University of Tokyo, Japan*

2009–f–07 (14:40–15:00)
Preliminary Thermal Design of UNITEC-1
Tsuyoshi Totani, Haruaki Ii, Masashi Wakita, Harunori Nagata, 20 Universities in UNISEC
Hokkaido University, Japan

2009-f-08 (15:00–15:20)

Generalized System of Mono- and Bi-Propellant Propulsion for Microsatellite
Hironori Sahara, Tatsuya Ide
Tokyo Metropolitan University, Japan

2009-f-09 (15:20–15:40)

Programmability of FPGA’s with the High-level Hardware Description Language Handel-C for Space Applications
Toshinori Kuwahara, Claas Ziemke, Michael Fritz, Mario Kobald, Marek Dittmar, Hans-Peter Roeser
Universitaet Stuttgart, Germany

[f-3] Small Satellite (2)

Session Date : 2009/7/10 15:50 – 17:10
Room : Room 405
Chairpersons : Kazuhiro Kimura (NICT, Japan)
Koji Tanaka (JAXA, Japan)

2009-f-10 (15:50–16:10)

About Nano-JASMINE Satellite System and Project Status
Nobutada Sako, Takaya Inamori, Kensuke Shimizu, Shinichi Nakasuka
University of Tokyo, Japan

2009-f-11 (16:10–16:30)

Development of the Structural System for Tohoku University SPRITE-SAT
Tomoki Sawakami, Kei Takiuchi, Eriko Ujiie, Yuji Sakamoto, Kazuya Yoshida, Yukihiro Takahashi
University of Tohoku, Japan

2009-f-12 (16:30–16:50)

Pre-Flight Analysis, Test Evaluation and Flight Verification of the Thermal System of Tohoku University SPRITE-SAT
Yuji Sakamoto, Yasuhiro Nakazato, Tomoki Sawakami, Kazuya Yoshida, Yukihiro Takahashi
Development and Flight Data Analysis of the Attitude Determination and Control System of Tohoku University SPRITE-SAT

Yuji Sakamoto, Kazuya Yoshida, Yukihiro Takahashi
Tohoku University, Japan

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[g-1] HTV-Derived System and ISS Transport

Session Date: 2009/7/9 11:10 – 12:10
Room: Room 406
Chairpersons: Michio Ito (JAXA, Japan)
Shinji Ishimoto (JAXA, Japan)

2009-g-01 (11:10–11:30)
Preliminary Study of the Recovery Capsule System Derived from HTV System
Eiichiro Nakano, Takane Imada, Yasufumi Wakabayashi
JAXA, Japan

2009-g-02 (11:30–11:50)
Manned Spacecraft Development Plan from HTV Technical Heritage
Takane Imada
JAXA, Japan

2009-g-03 (11:50–12:10)
Prospects of Mission Control in Case of Several Russian Transport Vehicles Attached to the ISS
Tatiana Matveeva
Rocket and Space Corporation Energia, Russia

[g-2] Space Tourism and Air Launch

Session Date: 2009/7/9 14:00 – 15:40
Room: Room 406
Chairpersons: Hiroshi Kawato (Nagoya Aerospace Systems Works, Mitsubishi Heavy Industries Ltd., Japan)
Takane Imada (JAXA, Japan)

2009-g-04 (14:00–14:20)
Affordable Microsattelite Launch Using the XP Spaceplane as a Reusable First Stage

Charles Lauer¹, David Faulkner¹, Misuzu Onuki²
¹Rocketplane Global, Inc., USA, ²Rocketplane Global, Inc., Space Frontier Foundation

2009-g-05 (14:20–14:40)

Conceptual Design of Space Tourism Vehicle by TDM

Kohei Taya¹, Tomomi Hirai¹, Akihiro Yui¹, Yuichi Noguchi², Takashi Makino¹, Hatsuo Mori¹, Hirotaka Kure¹
¹IHI Corporation, Japan, ²IHI AEROSPACE Co., Ltd., Japan

2009-g-06 (14:40–15:00)

Suborbital Space Tourism Study

Hiroshi Kawato, Takahiro Nakanii, Ko Ogasawara, Keiji Suzuki
Nagoya Aerospace Systems Works, Mitsubishi Heavy Industries Ltd., Japan

2009-g-07 (15:00–15:20)

Air Launch Systems for Small Satellites

Jun Yokote¹, Takayoshi Fuji², Kenji Sasaki², Seiji Matsuda¹, Kazuhiro Yagi¹, Mitsuteru Kaneoka³
¹IHI Aerospace Co., Ltd., Japan, ²Institute of Unmanned Space Experiment Free Flyer (USEF), Japan, ³CSP Japan, Inc., Japan

2009-g-08 (15:20–15:40)

Analysis and Control of Air Launched Rocket

Masashi Miura¹, Yasuhiro Morita²
¹The Graduate University for Advanced Studies (JAXA/ISAS), Japan, ²JAXA/ISAS, Japan

Descartes-Hyperport: A Discrete Event Simulation Environment for Advanced Launch Vehicle Operations Analysis

Session Date: 2009/7/9 15:50 – 16:50
Room: Room 406
Chairpersons: Takeshi Tsuchiya (The University of Tokyo, Japan)
Kenji Fujii (JAXA, Japan)
### Flight Test

**Session Date**  : 2009/7/10 9:00 – 10:20  
**Room**  :  Room 101  
**Chairpersons**  :  Koichi Yonemoto (Kyushu Institute of Technology, Japan)  
                    Shinji Ishimoto (JAXA, Japan)

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<td>2009-g-14 ( 9:00-9:20 )</td>
<td>Flight Trajectory Analysis of a Supersonic Flight Demonstrator for a Precooled Turbojet Engine</td>
<td>Yusuke Maru¹, Shujiro Sawai¹, Kazuhiya Fujita¹, Nobutaka Bando¹, Hiroaki Kobayashi¹, Shinichi Sakai¹, Tatsuaki Hashimoto¹, Shohei Kadooka²</td>
<td>JAXA, Japan, Musashi Institute of Technology, Japan</td>
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<td>Flow Angles and Mach Number Measurement Using Surface Pressures on the Nose Cone</td>
<td>Katsuyoshi Fukiba¹, Hiroaki Kobayashi², Nobuyuki Tsuboi², Motoyuki Hongoh²</td>
<td>Muroran Institute of Technology, Japan, JAXA, Japan</td>
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<td>Development and Flight Test of Winged Rocket</td>
<td>Takuya Shidooka, Sigeru Kaji, Tomoki Akiyama, Koji Okuda, Yuki Muranaka, Koichi Yonemoto</td>
<td>Kyushu Institute of Technology, Japan</td>
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# Parafoil Deployment Device for Unmanned Aerial Vehicle

Yasuhiro Inada¹, Koju Hiraki¹, Andreas Sholz², Toshiyuki Koga¹, Masanobu Inoue¹, Peter Voersmann², Thomas Krueger², Marco Buschmann³

¹Kyushu Institute of Technology, Japan, ²Technical University of Braunschweig, Germany, ³Mavionics, Germany

## [g-5] Advanced Solid Rocket

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<td>Yasuhiro Morita (ISAS/JAXA, Japan) Hiroto Habu (JAXA, Japan)</td>
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### 2009–g–18 (10:30–10:50)

**Advanced Solid Rocket Launcher and its Evolution**

Yasuhiro Morita¹, Takayuki Imoto¹, Hiroto Habu¹, Hirohito Ohtsuka², Keiichi Hori¹, Takemasa Koreki², Apollo Fukuchi², Yasuyuki Uekusa³, Ryojiro Akiba⁴

¹JAXA, Japan, ²IHI Aerospace Co., Ltd (IA), Japan, ³IHI Aerospace Engineering (ISE), Japan, ⁴Hokkaido Aeronautical Science and Technology Incubation Center (HASTIC), Japan

### 2009–g–19 (10:50–11:10)

**PBS (Post Boost Stage) Design of the Advanced Solid Rocket**

Kensaku Tanaka¹, Hirohito Otsuka¹, Koichi Saito¹, Takeshi Tamura¹, Nobuaki Ishii², Yukio Maeda², Yasuhiro Morita²

¹IHI AeroSpace, Japan, ²JAXA, Japan

### 2009–g–20 (11:10–11:30)

**The Development of Upper Stage Motor Case for the Advanced Solid Rocket**

Yusuke Suganuma¹, Koichi Kishi¹, Noboru Yanagisawa¹, Hiroshi Tamura¹, Kenji Minesugi², Ken Goto², Shinsuke Takeuchi², Kyoiochi Ui²

¹IHI Aerospace Co., Ltd., Japan, ²JAXA, Japan

### 2009–g–21 (11:30–11:50)

**A Minimized Facility Concept of the Advanced Solid Rocket Launch Operation**

Kazuyuki Miho¹, Toshiaki Hara¹, Satoshi Arakawa¹, Yasuo Kitai², Masao Yamanishi²

¹JAXA, Japan, ²IHI Aerospace co.ltd, Japan

### 2009–g–22 (11:50–12:10)
## Examination of Acoustic Prediction Methodology based on Measured Data in Static Firing Tests

Kota Fukuda, Seiji Tsutsumi, Kyoichi Ui, Tatsuya Ishii, Hideshi Oinuma, Junichi Kazawa, Kenji Minesugi, Kozo Fujii

*JAXA, Japan*

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### [g-6] Space Elevator (1)

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<td>Yoshio Aoki (Nihon University, Japan)</td>
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#### 2009-g-23 (14:00-14:20)

**Outline of Space Elevator and Perspective of the Future**

*Shuichi Ohno*

*Japan Space Elevator Association, Japan*

#### 2009-g-24 (14:20-14:40)

**Dynamic Response and Safety Design of the Space Elevator**

*Yoshio Aoki, Akihisa Tabata, Kento Suzuki, Nobuto Yoshino*

*Nihon University, Japan*

#### 2009-g-25 (14:40-15:00)

**Feasibility Study on Space Elevator**

*Hiroko Mukai\(^1\), Hironori Fujii\(^2\)*

\(^1\)*JAXA, Japan, \(^2\)*Kanagawa Institute of Technology/Nihon University, Japan

#### 2009-g-26 (15:00-15:20)

**Climber Mechanism of the Space Elevator**

*Hideyuki Natsume*

*Japan Space Elevator Association, Japan*

#### 2009-g-27 (15:20-15:40)

**Development of a Prototype Climber Model of a Space Elevator System**

*Masatoshi Hatano, Yosuke Aragane*

*Nihon University, Japan*

#### 2009-g-28 (15:40-16:00)
Development of a Probe Climber of the Space Elevator

Nobuto Yoshino, Yoshio Aoki

Nihon University, Japan

[g-7] Space Elevator (2)

Session Date: 2009/7/10 16:10 – 18:10
Room: Room 101
Chairpersons: Luigi Scatteia (CIRA – Italian Aerospace Research Centre, Italy)
Hiroko Mukai (JAXA, Japan)

2009-g-29 (16:10–16:30)

The Second Young Engineers’ Satellite: Innovative Technology Through Education

Hironori Fujii¹, Michiel Kruijff², Erik van der Heide³, Takeo Watanabe⁴
¹Kanagawa Institute of Technology/Nihon University, Japan, ²Delft University of Technology/Delta-Utec Space, The Netherlands, ³Delta-Utec Space, The Netherlands, ⁴Tokyo Metropolitan University, Japan

2009-g-30 (16:30–16:50)

Dynamics and Control of Tethered Satellite Systems with a Climber

Yohei Sugimoto¹, Hirohisa Kojima¹, Takeo Watanabe¹, Hironori Fujii²
¹Tokyo Metropolitan University, Japan, ²Kanagawa Institute of Technology, Japan

2009-g-31 (16:50–17:10)

A Consideration of Communication between Space Elevator and the Earth

Kento Ichikawa, Masato Tsuru

Kyushu Institute of Technology, Japan

2009-g-32 (17:10–17:30)

Japanese Space Train Concept

Akira Tsuchida¹, Amie Allison², Chie Saito¹, Eri Kagami¹
¹Earth-Track Corporation, Tsukuba Office, Japan, ²Earth-Track Corporation, Houston Office, USA

2009-g-33 (17:30–17:50)

Active Plasma Shield Generated by RMF for a Space Elevator

Hirotomo Itagaki¹, Tomohiko Asai¹, Kazuki Iguchi¹, Yuka Kobayashi¹, Tsutomu Takahashi¹, Michiaki Inomoto², Toshiki Takahashi³
Japanese Space Train Spin Offs

Amie Allison¹, Akira Tsuchida²
¹Earth-Track Corporation, Houston Office, USA, ²Earth-Track Corporation, Tsukuba Office, Japan

[h-1] Fluid Physics (1)

Session Date : 2009/7/8 9:00 – 10:20
Room : Room 202B
Chairpersons : Wen-Rui Hu (Institute of Mechanics, Chinese Academy of Sciences, China)
Kai Li (Institute of Mechanics, Chinese Academy of Sciences, China)

2009-h-01 ( 9:00-9:20 )

Onset of Oscillatory Thermocapillary Convection Depending on Aspect Ratio
Wen-Rui Hu
Institute of Mechanics, Chinese Academy of Sciences, China

2009-h-02 ( 9:20-9:40 )

Time-dependent Patterns at the Onset of Convection in Two-layer Benard–Marangoni System
Qi Kang, Lujun Li, Li Duan, Liang Hu
Institute of Mechanics, Chinese Academy of Sciences, China

2009-h-03 ( 9:40-10:00 )

On Two-phase Flows in Non-isothermal Systems with Cylindrical Symmetry
Valentina Shevtsova¹, Ilya Ryzhkov¹, Alex Nepomnyashchy²
¹University of Brussels, Belgium, ²Israel Institute of Technology, Israel

2009-h-04 ( 10:00-10:20 )

Effect of Interfacial Heat Transfer on the Onset of Oscillatory Thermocapillary Flow in Liquid Bridge
Kai Li, Bo Xun, Wenrui Hu
Institute of Mechanics, Chinese Academy of Sciences, China

[h-2-s] Fluid Physics (2)
2009–h–05 (10:30–10:50)

Experimental Study on the Thermal Performance of a Miniature Loop Heat Pipe with Different Orientations

Hiroki Nagai¹, Hosei Nagano², Fuyuko Fukuyoshi³, Hiroyuki Ogawa³
¹Tohoku University, Japan, ²Nagoya University, Japan, ³JAXA, Japan

2009–h–06 (10:50–11:10)

Thermophysical Properties Measurement of High-Temperature Melt by Parabolic Flight Levitation Experimental Facility (PFLEX)

Masahito Watanabe¹, Shumpei Ozawa², Akitoshi Mizuno², Taketoshi Hibiya³
¹Gakushuin University, Japan, ²Tokyo Metropolitan University, Japan, ³Keio University, Japan

2009–h–07 (11:10–11:30)

Influence of Vibrations on Diffusion in Liquids (IVIDIL). Ground Preparation of ISS Experiment

Valentina Shevtsova, Denis Melnikov, Aliaksandr Mialdun
University of Brussels, Belgium

2009–h–08s (11:30–11:50)

Visualization Measurement of External Flow Around an Acoustically Levitated Droplet

Koji Hasegawa
University of Tsukuba, Japan

2009–h–09s (11:50–12:10)

Comparison of Sound Wave Characteristics during 1 G and Microgravity Condition

Ahmad Helmi
Universiti Kuala Lumpur Malaysian Institute of Aviation Technology, Malaysia

2009–h–10s (12:10–12:30)

Thermal Control Design and Analysis for A Pico-satellite

Quang Huynh
Vietnam Academy of Science and Technology– Space Technology Institute, Viet Nam
[h-3] Recent Results in the ISS

Session Date : 2009/7/9 9:00 – 10:00
Room : Room 303
Chairpersons : Rainer Kuhl (German Aerospace Center (DLR), Germany)
Yoshinori Furukawa (Hokkaido University, Japan)

2009–h-11 ( 9:00–9:20 )

Recent Results of the German Microgravity Program in Physical Sciences
Rainer Kuhl
German Aerospace Center (DLR), Germany

2009–h-12 ( 9:20–9:40 )

Fluid Science Laboratory On-orbit Operations on the ISS Columbus Module: First Experiences and Lessons Learned
Giorgio Trinchero
Thales Alenia Space, Italy

2009–h-13 ( 9:40–10:00 )

Pattern Formation during Ice Crystal Growth –ISS KIBO Experiments–
Yoshinori Furukawa¹, Etsuro Yokoyama², Izumi Yoshizaki³, Taro Shimaoka⁴, Takehiko Sone⁵, Toshiyuki Tomobe⁶
¹Hokkaido University, Japan, ²Gakushuin University, Japan, ³JAXA, Japan, ⁴Japan Space Forum, Japan, ⁵Japan Manned Space Systems Corporation, Japan, ⁶IHI AeroSpace, Japan

[h-4] Microgravity Experiment Systems

Session Date : 2009/7/9 10:10 – 11:50
Room : Room 303
Chairpersons : Takehiko Ishikawa (JAXA, Japan)
Shinichi Yoda (JAXA, Japan)

2009–h-14 ( 10:10–10:30 )

Increase of Orbital Stations Utilization Efficiency
Mikhail Beliaev
Rocket and Space Corporation Energia, Russia

2009–h-15 ( 10:30–10:50 )

The XP Spaceplane as a Low Cost Reusable Intermediate Duration Microgravity Laboratory
Charles Lauer¹, David Faulkner¹, Misuzu Onuki²
¹Rocketplane Global, Inc., USA, ²Rocketplane Global, Inc., Space Frontier Foundation

2009–h–16 (10:50–11:10)

NASA Ames Hover Test Vehicle: Further Results

Christopher Boshuizen¹, Eleanor Crane², Douglas Forman³
¹NASA Ames Research Center, USA, ²Stanford University, USA, ³MEI Company, USA

2009–h–17 (11:10–11:30)

Results from MASER 11 Microgravity Sounding Rocket Mission

Christian Lockowandt, Kenneth Löth, Gunnar Florin, Jimmy Thorstensson, Per Holm, Olle Norberg, Stig Kemi
Swedish Space Corporation, Sweden

2009–h–31 (11:30–11:50)

Growth from Solution in Space: an Overview of Present and Future ESA Projects

Stefano Mazzoni, Vladimir Pletser, Olivier Minster
ESA/ESTEC, The Netherlands

[h–5] Experiment Techniques

Session Date : 2009/7/9 14:00 – 15:40
Room : Room 303
Chairpersons : Li Duan (Institute of Mechanics, Chinese Academy of Sciences, China)
Masahito Tagawa (Kobe University, Japan)

2009–h–18 (14:00–14:20)

The Real-time March–Zehnder Interferometer which may be Used in Space Experiment

Li Duan, Qi Kang
Institute of Mechanics, Chinese Academy of Sciences, China

2009–h–19 (14:20–14:40)

New Sensor and Actuator for Space Tether Control Technology

Taipro Kusagaya¹, Hironori Fujii², Takeo Watanabe³, Yukita Kojima³, Yohei Minagawa³
¹Comprehensive Research Organization for Science and Society, Japan, ²Kanagawa Institute Technology, Japan, ³Tokyo Metropolitan University, Japan

2009–h–20 (14:40–15:00)
### Verification of Charging Measurement Method Using Parallel Plate Electrostatic Analyzer

Naomi Kurahara, Mengu Cho  
*Kyushu Institute of Technology, Japan*

**2009-h-21 (15:00–15:20)**

### A Consideration of Future Flight Material Exposure Experiments in Japan: Advanced Material Exposure Test Working Groups Proposal

Masahito Tagawa¹, Kumiko Yokota¹, Mengu Cho², Minoru Iwata², Rikio Yokota³, Mineo Suzuki³, Koji Matsumoto³, Yugo Kimoto³, Eiji Miyazaki³, Hiroyuki Shimamura³  
¹Kobe University, Japan, ²Kyushu Institute of Technology, Japan, ³JAXA, Japan

**2009-h-22 (15:20–15:40)**

### A Research of the Micro-Wave Irradiation Effect to Plants

Yoshitsugu Toda, Hiroshi Murakami, Toshiaki Iwata, Yoshiyuki Abe  
*Advanced Industrial Science and Technology, Japan*

**2009-h-23 (15:50–16:10)**

### Flame Spread over Electric Wire in Space Environment: Steady or Unsteady?

Yuji Nakamura, Keisuke Azumaya, Hiroyuki Ito, Osamu Fujita  
*Hokkaido University, Japan*

**2009-h-24 (16:10–16:30)**

### Observation of Flame Spreading over Electric Wire under Reduced Gravity Conditions Given by Parabolic Flight and Drop Tower Experiments

Yosuke Onishi¹, Osamu Fujita¹, Kei Agata¹, Hiroyuki Takeuchi¹, Yuji Nakamura¹, Hiroyuki Ito¹, Masao Kikuchi²  
¹Hokkaido University, Japan, ²JAXA, Japan

**2009-h-25 (16:30–16:50)**

### Spontaneous Ignition of a Droplet Pair in Microgravity

Osamu Moriuue, Yosuke Yamaguchi, Daijiro Eto, Takuro Emura, Amirrudin bin Jaafar, Eiichi Murase
Effects of Carbon Dioxide on Unsteady Combustion of Isolated Fuel Droplet in Microgravity

Shinji Nakaya, Yoshiaki Nagashima, Kohei Takase, Daisuke Segawa, Toshikazu Kadota
Osaka Prefecture University, Japan

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[9:00-9:20]
A Space to Earth Demonstration of Wireless Power Transmission

Frank Little\(^1\), Kai Chang\(^1\), Rainer Fink\(^1\), G Arndt\(^2\), Phong Ngo\(^2\), James McSpadden\(^3\), Raymond Beach\(^4\)
\(^1\)Texas A&M University, USA, \(^2\)NASA Johnson Space Center, USA, \(^3\)Raytheon Company, USA, \(^4\)NASA Glenn Research Center, USA

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Microwave Power Transmission Experiment on Ground for SSPS Demonstration

Susumu Sasaki\(^1\), Advanced Mission Research Group JAXA\(^2\)
\(^1\)JAXA, Japan, \(^2\)ARD

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Ground System Design of Space Demonstration Experiment for Solar Power Satellite

Koji Tanaka\(^1\), Susumu Sasaki\(^1\), Yoshiyuki Fujino\(^2\)
\(^1\)ISAS/JAXA, Japan, \(^2\)NICT, Japan

---

Demonstration for Space Based Solar Power(SBSP) Using JEM of International Space Station

Satoru Togashi\(^1\), James Grady\(^2\)
\(^1\)Tokai University, Japan, \(^2\)NASA, USA
2009–j–01 (9:00–9:20)

On-board Evaluation Results of Active Phased Array Antenna for WINDS Satellite

Masanobu Yajima¹, Takumi Hasegawa², Tomonori Kuroda¹, Masaaki Shimada¹

¹JAXA, Japan, ²Space Engineering Development Co., Ltd., Japan

2009–j–02 (9:20–9:40)

Antenna Pattern Measurement of the Large Deployable Reflector of ETS–VIII

Motofumi Usui¹, Hiroki Kohata¹, Toru Hamaki², Yasuhiko Yamasa²

¹JAXA, Japan, ²NEC–Toshiba Space Systems, Japan

2009–j–04 (9:40–10:00)

Relationship between Delay Time of GPS Satellites and Total Electron Content at Chumphon Station, Thailand

Prasert Kenpankho, Pusit Suvannasang, Pornchai Supnithi

King Mongkut’s Institute of Technology Ladkrabang, Thailand

2009–j–05 (10:30–10:50)

Development of Multi-mode Integrated Transponder (MTP)

Johta Awano¹, Masanobu Yajima¹, Masashi Shirakura¹, Takashi Okamoto¹, Noboru Takata¹, Syozo Nakazato², Masayoshi Yoneda³

¹JAXA, Japan, ²NEC, Japan, ³NTspace, Japan

2009–j–06 (10:50–11:10)

A Development of X-band High-speed Modulator

Kazuya Inaoka¹, Johta Awano¹, Takashi Okamoto¹, Masashi Shirakura¹, Masanobu Yajima¹, Masaaki Shimada¹, Noboru Takata¹, Terumi Sunaga², Akira Kurita², Ichiro Inamori²
Ka-Band Coherent Transmitter to Extend X-Band Deep Space Digital Transponder
Atsushi Tomiki\textsuperscript{1}, Tomoaki Toda\textsuperscript{1}, Tomoko Nagae\textsuperscript{1}, Hirobumi Saito\textsuperscript{1}, Hideho Tomita\textsuperscript{2}, Takehiko Kobayashi\textsuperscript{3}
\textsuperscript{1}JAXA, Japan, \textsuperscript{2}Mitsubishi Electric Corporation, Japan, \textsuperscript{3}Tokyo Denki University, Japan

The Flight Model Development of Communication System for PLANET-C and Its Validity
Tomoaki Toda, Tomoko Nagae, Yukio Kamata, Nobuaki Ishii, Masato Nakamura
JAXA, Japan

Intersatellite Range Determination Using Multi-detector Observation of Pulsars
Sheng Lan, Ji Wang, Guo Fan, Guo Xu
Harbin Institute of Technology, China

Ka-Band High-speed Communication Systems on Small Satellites for Future Advanced Communication Networks and Earth Observations
Toshinori Kuwahara, Michael Lengowski, Ulrich Beyermann, Alexander Uryu, Hans-Peter Roeser
Universitaet Stuttgart, Germany

A Study on Influence of Inter-channel Interference of Multi-level Digital Modulations for Broadcasting Satellite
Masaaki Kojima, Hisashi Sujikai, Yoichi Suzuki, Akinori Hashimoto, Shoji Tanaka, Takeshi Kimura, Kazuyoshi Shogen
NHK Science & Technical Research Laboratories, Japan
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<td>Toshihiko Kitano, Hiroshi Juzoji, Isao Nakajima</td>
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<td>Tungalag Amar</td>
<td>National University of Mongolia (NUM), Mongolia</td>
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[k-1] Small Solar System Bodies Exploration (1) Asteroid Properties and Deflection Strategy

**Session Date:** 2009/7/7 9:00 - 10:20  
**Room:** Hall 300  
**Chairpersons:** Mutsuko Morimoto (JAXA, Japan), Makoto Yoshikawa (JAXA/JSPEC & ISAS, Japan)

### 2009-k-02 (9:00-9:20)

**Specific Effects of the Largest Asteroids on Mars and the Earth’s Orbital Motions, Geocentric Distance and Longitude**

Jean Souchay\(^1\), Damien Gauchez\(^1\), Alin Nedelcu\(^2\)  
\(^1\)Observatoire de Paris, France, \(^2\)Inst. Astron. Acad. Romane, Romania

### 2009-k-03 (9:20-9:40)

**Dynamics of Asteroid 1999 JU3: Target of the Hayabusa Follow-on Mission**

Julie Bellerose\(^1\), Hajime Yano\(^2\)  
\(^1\)JAXA/JSPEC, Japan, \(^2\)JAXA/JSPEC & ISAS, Japan

### 2009-k-08 (9:40-10:00)

**Orbital and Surface Dynamics for Proximity Operations and Sample Return Strategies at 4015 Wilson-Harrington**

Julie Bellerose\(^1\), Hajime Yano\(^2\)  
\(^1\)JAXA/JSPEC, Japan, \(^2\)JAXA/JSPEC & ISAS, Japan

### 2009-k-04 (10:00-10:20)

**Conceptual Design of a Multi-mirror System for Asteroid Deflection**

Christie Maddock\(^1\), Massimiliano Vasile\(^1\), Leopold Summerer\(^2\)  
\(^1\)University of Glasgow, UK, \(^2\)Advanced Concepts Team ESA/ESTEC, The Netherlands

[k-2] Small Solar System Bodies Exploration (2) New Generation of Asteroid Sample Returns
2009-k-05 (10:30–10:50)

**Hayabusa Follow-on Asteroid Sample Return Missions**

Makoto Yoshikawa, Hajime Yano, Tetsuya Yamada, Mutsuko Morimoto, Masatoshi Matsuoka, Junichiro Kawaguchi, Masanao Abe, Kazutaka Nishiyama, Tetsuo Yoshimitsu, Detlef Koschny, Antonella Barucci, David Agnolon, Jens Romstedt, Lutz Richter

1JAXA, Japan, 2NEC Aerospace Systems, Japan, 3ESTEC/ESA, The Netherlands, 4Paris Observatory, France, 5DLR, Germany

2009-k-07 (10:50–11:10)

**Marco Polo, a JAXA-ESA Mission to Return a Sample from a Near-Earth Object**

Detlef Koschny, Antonella Barucci, Makoto Yoshikawa, Hermann Bönhardt, John Brucato, Marcello Coradini, Elizabetta Dotto, Ian Franchi, Simon Green, Jean-Luc Josset, Junichiro Kawaguchi

1ESA/ESTEC, The Netherlands, 2LESIA, Paris Observatory, France, 3JSPEC/JAXA, Japan, 4MPI Lindau, Germany, 5INAF–OAA, Florence, 6ESA HQ, France, 7INAF–OAR, Italy, 8The Open University, UK, 9Space Exploration Institute, CH

2009-k-09 (11:10–11:30)

**Guidance Navigation & Control for Hayabusa Follow-on Mission in Proximity to the Target Object**

Fuyuto Terui, Naoko Ogawa, Osamu Mori, Takashi Kubota

JAXA, Japan

2009-k-11 (11:30–12:00)

**Discussion on New Generations of Asteroid Sample Returns**

Moderator: H. Yano

JAXA/JSPEC & ISAS, Japan
2009-k-10 (14:00–14:20)

Close-up Imagery System to Monitor Sampling Sites on a Microgravity Asteroid Surface

Naoko Ogawa¹, Hirohide Demura², Naru Hirata², Makoto Yoshikawa¹, Hajime Yano¹

¹JAXA, Japan, ²University of Aizu, Japan

2009-k-11 (14:20–14:40)

Development of Sampling Systems for Small Solar System Bodies onboard Hayabusa Follow-on Missions

Hajime Yano¹, Takaaki Noguchi², Saburo Matsunaga³, Osamu Mori¹, Hironori Fujii⁴, Takeo Watanabe⁵

¹JAXA/JSPEC & ISAS, Japan, ²Ibaraki University, Japan, ³Tokyo Institute of Technology, Japan, ⁴Kanagawa Institute of Technology, Japan, ⁵Tokyo Metropolitan University, Japan

2009-k-12 (14:40–15:00)

Study on Penetration of Sampler for Asteroid Exploration

Ryotaro Ohkawa¹, Hironori Fujii², Takeo Watanabe³, Yuzo Shimada¹, Akio Abe¹, Takeshi Sakamoto⁴

¹Nihon University, Japan, ²Nihon University and Kanagawa Institute of Technology, Japan, ³Tokyo Metropolitan University, Japan, ⁴Kagoshima University, Japan

[k-4] Surface Exploration (1) Landers and Rovers on Microgravity Bodies

Session Date : 2009/7/7 15:10 – 16:30
Room : Hall 300
Chairpersons : Shin-ichiro Nishida (JAXA Space Exploration Center, Japan)
               Hajime Yano (JAXA/JSPEC & ISAS, Japan)

2009-k-14 (15:10–15:30)

Jumping Mechanism for Asteroid Rover with the Use of Resonance and Electrical Stiffness Switching

Yoshiki Sugawara, Kou Mizuguchi, Nobuyuki Kobayashi

Aoyama Gakuin University, Japan

2009-k-15 (15:30–15:50)

Multi-Limbed Robot Control on Asteroid Exploration Missions

Marco Chacin¹, Andres Mora²

¹Cyberdyne Inc. / University of Tsukuba, Japan, ²Tohoku University, Japan

2009-k-16 (15:50–16:10)
Analysis of the Interaction between Uneven Surfaces and a Crawler-type Rover

Marco Chacin¹, Kousuke Sasahara², Andres Mora³

¹Cyberdyne Inc. / University of Tsukuba, Japan, ²Kobe University, Japan, ³Tohoku University, Japan

2009-k-17 (16:10-16:30)

A Novel Navigation System based on Occlusion Detection for Planetary Exploration Rovers

Andres Mora¹, Keiji Nagatani¹, Kazuya Yoshida¹, Marco Chacin²

¹Tohoku University, Japan, ²Cyberdyne Inc./University of Tsukuba, Japan

[k-5] Surface Exploration (2) Landers and Rovers on High Gravity Bodies

Session Date: 2009/7/7 16:40 - 18:20
Room: Hall 300
Chairpersons: Fuyuto Terui (JAXA, Japan)
Marco Chacin (Cyberdyne Inc. / University of Tsukuba, Japan)

2009-k-18 (16:40-17:00)

A Study on Small Lunar Lander: SLIM

Takahide Mizuno¹, Shujiro Sawai¹, Seisuke Fukuda¹, Daisuke Kobayashi¹, Nobutaka Bando¹, Shin-ichiro Sakai¹, Ken Higuchi¹, Tetsuo Yoshimitsu¹, Takashi Kubota¹, Tatsuaki Okada¹, Katsumi Furukawa²

¹JAXA, Japan, ²Mitsubishi Heavy Industries, LTD., Japan

2009-k-19 (17:00-17:20)

A Mobility System for Lunar Work Rover

Shin-Ichiro Nishida, Sachiko Wakabayashi
JAXA Space Exploration Center, Japan

2009-k-20 (17:20-17:40)

Autonomy and Intelligence for Lunar or Planetary Surface Explorer

Takashi Kubota¹, Masatsugu Otsuki¹, Manabu Sugiura², Yasuharu Kunii³, Yoji Kuroda⁴

¹ISAS/JAXA, Japan, ²Souken University, Japan, ³Chuo University, Japan, ⁴Meiji University, Japan

2009-k-21 (17:40-18:00)

Preliminary Study on Lander System and Scientific Investigation for Next Mars Exploration
### Session Date: 2009/7/8 9:00 - 10:40

**Room:** Hall 200  
**Chairpersons:** Yoshifumi Saito (JAXA, Japan)  
Julie Bellerose (JAXA/JSPEC, Japan)

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**2009-k-33 (18:00-18:20)**

**Long-term Operation of the Energy Storage System for Lunar and Planetary Missions**

Yoshitsugu Sone, Takeshi Hoshino, Kawaguchi Jun’ichiro  

**JAXA, Japan**

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**[k-6] Planetary Environment Exploration (1) New Concepts for Mars Missions**

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**2009-k-22 (9:00-9:20)**

**Japan’s Mars Exploration with a Lander and Orbiters (MELOS): An Overview of Mission**

Takehiko Satoh¹, Takashi Kubota¹, Tatsuaki Okada¹, Ayako Matsuoka¹, Takeshi Imamura¹, Naoko Ogawa¹, Hideaki Miyamoto², Naoki Terada³, Kanako Seki⁴, Kazuhisa Fujita¹  

¹ISAS, JAXA, Japan, ²Tokyo University, Japan, ³NICT, Japan, ⁴Nagoya University, Japan

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**2009-k-23 (9:20-9:40)**

**Preliminary Mission Analysis and Orbit Design for Next Mars Exploration**

Naoko Ogawa¹, Mutsuko Morimoto¹, Yuichi Tsuda¹, Tetsuya Yamada¹, Kazuhisa Fujita¹, Tomohiro Yamaguchi², Yasuhiro Kawakatsu¹, Takashi Kubota¹, Jun’ichiro Kawaguchi¹  

¹JAXA, Japan, ²The Graduate University for Advanced Studies, Japan

---

**2009-k-24 (9:40-10:00)**

**Launch Opportunities for Mars Exploring Mission in 2015-2020**

Nobuaki Ishii¹, Naoko Ogawa², Mutsuko Morimoto², Takehiko Satoh¹  

¹JAXA, Japan, ²JSPEC/JAXA, Japan

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**2009-k-25 (10:00-10:20)**

**Assessment of Aeroassist Orbital Maneuver Technologies for Next Mars Exploration**

Kazuhisa Fujita, Takashi Kubota, Junko Ogawa, Mitsuko Morimoto, Toshiyuki Suzuki, Hiroki Takayanagi, Tetsuya Yamada, Junichi Kawaguchi

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### Preliminary Study of Nonstop Mars Sample Return System Using Aerocapture Technologies

Kazuhsa Fujita\(^1\), Shogo Tachibana\(^2\), Seiji Sugita\(^2\), Hirdy Miyamoto\(^2\), Takashi Mikouchi\(^2\), Toshiyuki Suzuki\(^2\), Hiroki Takayanagi\(^2\), Junichiro Kawaguchi\(^2\)

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

### Session Date:

2009/7/8 10:50 - 12:30

**Room:** Hall 200

**Chairpersons:** Takehiko Satoh (ISAS, JAXA, Japan), Dmitriy Titov (Max Planck Institute for Solar System Research, Germany)

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### BepiColombo is a Mission to Mercury with the Collaboration of European Space Agency (ESA) and Japan Aerospace Exploration Agency (JAXA)

Hajime Hayakawa\(^1\), Hiroyuki Ogawa\(^1\), Kenji Minesugi\(^1\), Takeshi Takashima\(^1\), Ayako Matsuoka\(^1\), Shingo Kameda\(^1\), Hiroshi Yamakawa\(^2\), Yasumasa Kasaba\(^3\)

\(^1\)JAXA, Japan, \(^2\)Kyoto University, Japan, \(^3\)Tohoku University, Japan

### Venus Express: a Fascinating Journey to Our Planet-neighbour

Dmitriy Titov\(^1\), H. Svedhem\(^2\)

\(^1\)Max Planck Institute for Solar System Research, Germany, \(^2\)ESA/ ESTEC, The Netherlands

### PLANET-C: Venus Climate Orbiter Mission of Japan

Masato Nakamura, Nobuaki Ishii, Takeshi Imamura

JAXA, Japan

### SCOPE: Formation-Flight Magnetospheric Satellite Mission

Yoshifumi Saito\(^1\), Yuichi Tsuda\(^1\), Kiyoshi Maezawa\(^1\), Masaki Fujimoto\(^1\), Iku Shinohara\(^1\), Hirotsugu Kojima\(^2\), Ken Higuchi\(^1\), Tomoaki Toda\(^1\), Takeshi Takashima\(^1\), Ayako Matsuoka\(^1\)
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<td>Hall 200</td>
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</table>
| Chairpersons       | Naru Hirata (The University of Aizu, Japan)  
                     Takahiro Iwata (JAXA, Japan) |

2009-k-32 (9:20-9:40)

Technologies Needed to Survive on the Moon

Takeshi Hoshino¹, Kohtaro Matsumoto²

¹JSPEC/JAXA, Japan, ²JAXA, Japan

2009-k-34 (9:40-10:00)

Development of Advanced Subsurface Exploration Test Facility and its Preliminary Results

Sachiko Wakabayashi, Takeshi Hoshino, Shoichi Yoshihara

JAXA, Japan

2009-k-35 (10:00-10:20)

NASAs Constellation Program: Plans for the Human Lunar Return and Lunar Outpost

Jennifer Rhatigan, Kathy Laurini, Christopher Culbert, Calvin Seaman

NASA, USA

2009-k-36 (10:20-10:40)

Architecture Study for Human Lunar Exploration

Naoki Sato, Hiroshi Imamura

JAXA, Japan

2009-k-37 (10:40-11:00)
## [k-9] Lunar Exploration (2) More Scientific Results of Kaguya and Beyond

### Session Date: 2009/7/9 14:20 - 16:00
### Room: Hall 200
### Chairpersons: Naoki Sato (JAXA, Japan) 
Jennifer Rhatigan (NASA, USA)

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<td>2009-k-38</td>
<td>14:20-14:40</td>
<td>Morphological and Spectral Analyses of Large Lunar Craters: Insights from Images of LISM/Kaguya</td>
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<td>Naru Hirata&lt;sup&gt;1&lt;/sup&gt;, Jun-ichi Haruyama&lt;sup&gt;2&lt;/sup&gt;, Makiko Ohtake&lt;sup&gt;2&lt;/sup&gt;, Tsuneo Matsunaga&lt;sup&gt;3&lt;/sup&gt;, Tomokatsu Morota&lt;sup&gt;2&lt;/sup&gt;, Chikatoshi Honda&lt;sup&gt;2&lt;/sup&gt;, Takamitsu Sugihara&lt;sup&gt;4&lt;/sup&gt;, Hideaki Miyamoto&lt;sup&gt;5&lt;/sup&gt;, Hirohide Demura&lt;sup&gt;1&lt;/sup&gt;, Noriaki Asada&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>1The University of Aizu, Japan, 2ISAS/JAXA, Japan, 3NIES, Japan, 4JAMSTEC, Japan, 5The University of Tokyo, Japan</td>
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<td>2009-k-39</td>
<td>14:40-15:00</td>
<td>X-Ray Experiments around the Moon by XRS onboard KAGUYA</td>
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<td>Tatsuaki Okada&lt;sup&gt;1&lt;/sup&gt;, Hiroaki Shiraishi&lt;sup&gt;1&lt;/sup&gt;, Kei Shirai&lt;sup&gt;1&lt;/sup&gt;, Yukio Yamamoto&lt;sup&gt;1&lt;/sup&gt;, Takehiko Arai&lt;sup&gt;2&lt;/sup&gt;, Kazunori Ogawa&lt;sup&gt;1&lt;/sup&gt;, Manuel Grande&lt;sup&gt;3&lt;/sup&gt;, Manabu Kato&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>1JAXA, Japan, 2National Astronomical Observatory of Japan, Japan, 3University of Wales, UK</td>
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<td>2009-k-40</td>
<td>15:00-15:20</td>
<td>Lunar Crustal Composition Estimated by the SELENE Multiband Imager</td>
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<td>Makiko Ohtake&lt;sup&gt;1&lt;/sup&gt;, Y. Yokota&lt;sup&gt;1&lt;/sup&gt;, J. Haruyama&lt;sup&gt;1&lt;/sup&gt;, T. Mastunaga&lt;sup&gt;2&lt;/sup&gt;, Y. Yokota&lt;sup&gt;1&lt;/sup&gt;, T. Morota&lt;sup&gt;1&lt;/sup&gt;, C. Honda&lt;sup&gt;1&lt;/sup&gt;, M. Torii&lt;sup&gt;1&lt;/sup&gt;, Y. Ogawa&lt;sup&gt;2&lt;/sup&gt;, LISM Team</td>
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<td>1JAXA, Japan, 2The National Institute for Environmental Studies (NIES), Japan</td>
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<td>Yuto Shibata&lt;sup&gt;1&lt;/sup&gt;, Noriaki Asada&lt;sup&gt;1&lt;/sup&gt;, Naru Hirata&lt;sup&gt;1&lt;/sup&gt;, Hirohide Demura&lt;sup&gt;1&lt;/sup&gt;, Yasuhiro Yokota&lt;sup&gt;2&lt;/sup&gt;, Tomokatsu Morota&lt;sup&gt;2&lt;/sup&gt;, Chikatoshi Honda&lt;sup&gt;2&lt;/sup&gt;, Tsuneo Matsunaga&lt;sup&gt;3&lt;/sup&gt;, Makiko Ohtake&lt;sup&gt;2&lt;/sup&gt;, Haruyama Junichi&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>1The University of Aizu, Japan, 2JAXA, Japan, 3National Institute for Environmental Studies, Japan</td>
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2009–k–42 ( 15:40–16:00 )

A Study on the Observation System for the Lunar Low Frequency Astronomical Observatory

Takahiro Iwata¹, Hirotomo Noda², Hiroaki Misawa³, Kazumasa Imai⁴, Tetsuro Kondo⁵, Hiroshi Takeuchi¹, Fuminori Tsuchiya³, Tomoyuki Nakajo⁶, Yasuhiro Nariyuki³, Kazuyoshi Asari², Nobuyuki Kawano²

¹JAXA, Japan, ²National Astronomical Observatory, Japan, ³Tohoku University, Japan, ⁴Kochi National College of Technology, Japan, ⁵NIOT, Japan, ⁶Fukui University of Technology, Japan

[k–10] Outer Planet Exploration: Solar Sail Technology to Jupiter and Trojans

Session Date : 2009/7/9 16:10 – 18:10
Room : Hall 200
Chairpersons : Hiroshi Yamakawa (Kyoto University, Japan)
Christie Maddock (University of Glasgow, UK)

2009–k–43 ( 16:10–16:30 )

Development of IKAROS Mission Mechanism to Deploy Solar Sail

Hirotaka Sawada¹, Yoji Shirasawa², Osamu Mori¹

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

2009–k–44 ( 16:30–16:50 )

Photon Acceleration Model of Flexible Spinning Solar Sail

Yuya Mimasu¹, Akifumi Kitajima², Ryu Funase³, Osamu Mori³, Jun’ichiro Kawaguchi³

¹Kyushu University, Japan, ²The University of Tokyo, Japan, ³JAXA, Japan

2009–k–45 ( 16:50–17:10 )

Trajectory Analysis for Jupiter and Trojan Asteroids by Large Solar Cell Membrane

Jun’ichiro Kawaguchi¹,², Mutsuko Morimoto¹, Osamu Mori¹,², Ryu Funase¹, Jupiter and Trojans Exploration WG Preparation Team

¹JAXA Space Exploration Center (JSPEC), Japan, ²Institute of Space and Astronautical Science (ISAS) / JAXA, Japan

2009–k–46 ( 17:10–17:30 )

Exploration of the Jovian System by EJSM (Europa Jupiter System Mission): Origin of Jupiter and Evolution of Satellites

Sho Sasaki¹, Masaki Fujimoto², Jun Kimura², Tatsuaki Okada², Takeshi Takashima², Masahiro Ikoma³, Takeshi Naganuma⁴, Atsushi Yamaji⁵, Hauke Hussmann⁶, Kei Kurita⁷, Yasumasa Kasaba⁸

¹JAXA, Japan, ²National Astronomical Observatory, Japan, ³Tohoku University, Japan, ⁴Kochi National College of Technology, Japan, ⁵NIOT, Japan, ⁶Fukui University of Technology, Japan, ⁷Shizuoka University, Japan, ⁸University of Tokyo, Japan
2009-k-47 (17:30–17:50)

Science of Trojan Asteroid Exploration as Clues of the Origin and Evolution of the Jovian System

Hajime Yano¹, Fumi Yoshida², Naruhsa Takato², Eiichiro Kokubo², JAXA Jupiter and Trojans Exploration¹

¹JAXA/JSPEC & ISAS, Japan, ²National Astronomical Observatory of Japan, Japan

2009-k-48 (17:50–18:10)

Trojan Binary Asteroid Systems as Future Mission Targets

Julie Bellerose¹, Hajime Yano²

¹JAXA/JSPEC, Japan, ²JAXA/JSPEC & ISAS, Japan

[m-1] Geospace, Earth and Future Technologies

Session Date: 2009/7/8 9:00 – 10:40
Room: Room 202A
Chairpersons: Takeshi Imamura (JAXA, Japan)
Taro Sakao (JAXA, Japan)

2009-m-01 (9:00–9:20)

Final Design and Performance Parameters of the Payloads PYREX, PHLUX and RESPECT on EXPERT

Sebastian Lein¹, Andreas Steinbeck¹, Arianit Preci¹, Markus Fertig¹, Georg Herdrich¹, Joerg Hollandt², Berndt Gutschwager², Thomas Reimer³, Hans-Peter Roesser¹, Monika Auweter-Kurtz⁴

¹Universitaet Stuttgart, Germany, ²Physikalisch-Technische Bundesanstalt (PTB), Germany, ³DLR Institute of Structures and Design, Germany, ⁴University of Hamburg, Germany

2009-m-02 (9:20–9:40)

Measurement of Bare Tape-Tether Length in a New Deployment Method

Satoshi Tamura¹, Hironori Fujii¹, Yasuhisa Osada¹, Gen Kaino¹, Hiroki Endoh¹, Saburo Nakamura¹, Takahiro Aizawa¹, Masaya Ura¹, Toshihiro Mizuno¹, Takeo Watanabe²

¹Kanagawa Institute of Technology, Japan, ²Tokyo Metropolitan University, Japan
Miniaturization of Plasma Wave Receivers onboard Scientific Satellites and its Application to the Sensor Network System for Monitoring the Electromagnetic Environment in Space

Hirotugu Kojima¹, Yuta Mizuochi¹, Hajime Fukuhara¹, Satoshi Yagitani², Hirokazu Ikeda³, Hisato Iwai⁴, Yasuhsa Takizawa⁵, Hiroshi Yamakawa¹, Yoshikatsu Ueda¹, Hideyuki Usui¹

¹Kyoto University, Japan, ²Kanazawa University, Japan, ³JAXA, Japan, ⁴Doshisha University, Japan, ⁵Advanced Telecommunication Research Institute, Japan

2009–m–04 (10:00–10:20)

Geospace Exploration Mission: ERG Project

Yoshizumi Miyoshi¹, Kanako Seki¹, Kazuo Shiokawa¹, Takayuki Ono², Yasumasa Kasaba², Atsushi Kumamoto², Masafumi Hirahara³, Takeshi Takashima⁴, Kazushi Asamura⁴, Ayako Matsuoka⁴

¹Nagoya University, Japan, ²Tohoku University, Japan, ³University of Tokyo, Japan, ⁴JAXA/ISAS, Japan

2009–m–05 (10:20–10:40)

SPRITE-SAT: a Micro Satellite for Scientific Observation of Transient Luminous Events and Terrestrial Gamma-ray Flashes

Kazuya Yoshida, Yukihiro Takahashi, Yiji Sakamoto, Takeshi Sakano, and SPRITE-SAT Development/Operation Team

Tohoku University, Japan

[Space Telescope Missions]

Session Date: 2009/7/8 10:50 – 12:30
Room: Room 202A
Chairpersons: Kazuya Yoshida (Tohoku University, Japan)
Yoshizumi Miyoshi (Nagoya University, Japan)

2009–m–06 (10:50–11:10)

Highlights of Hinode Observations and Future Prospects

Taro Sakao
JAXA, Japan

2009–m–07 (11:10–11:30)

Sprint-A/Exceed Mission

Munetaka Ueno¹, Ichiro Yoshikawa¹, Naoki Terada², Yasumasa Kasaba³, Fuminori Tsuchiya³, Atsushi Yamazaki⁴, Shujiro Sawai⁴, Seisuke Fukuda⁴, Shinichiro Sakai⁴, Kazunori Uemizu⁴
[m-3]  International Collaboration toward Medium Latitude Long Duration Flight
(1)

Session Date : 2009/7/9 9:00 – 10:20
Room : Room 202A
Chairpersons : David Gregory (NASA, Wallops Flight Facility, USA)
              Tetsuya Yoshida (JAXA, Japan)

2009-m-11 ( 9:00-9:20 )
International Collaboration toward Medium Latitude Long Duration Flight
Jun Nishimura
ISAS, JAXA, Japan

2009-m-12 ( 9:20-9:40 )
Long Duration Balloon Flights From Esrange
Stig Kemi, Ola Widell, Lennart Poromaa
Swedish Space Corporation/Esrange, Sweden

2009-m-14 ( 9:40-10:00 )
The Italian Stratospheric Activities and Science Opportunities on Long Duration Balloon Missions

Domenico Spoto¹, R. Ibba², S. Rastelli², S. Masi³, S. Peterzen³, A. Cardillo⁴

1Italian Space Agency, Italy, ²Agenzia Spaziale Italiana, Italy, ³Università La Sapienza, Italy, ⁴ISTI–CNR Pisa, Italy

2009–m–15  ( 10:00–10:20 )

LDBF in China – Past and Future

Yidong Gu

Institute of High Energy Physics, China

[m–4] International Collaboration toward Medium Latitude Long Duration Flight (2)

Session Date : 2009/7/9 10:50 – 11:50
Room : Room 202A
Chairpersons : Naoki Izutsu (JAXA, Japan)
Tadayuki Takahashi (JAXA, Japan)

The NASA Scientific Balloon Program in the Space Era

David Gregory

NASA, Wallops Flight Facility, USA

2009–m–16  ( 10:50–11:10 )

Japanese Contribution for Mid-latitude Long Duration Balloon Flights

Tetsuya Yoshida

ISAS, JAXA, Japan

2009–m–17  ( 11:10–11:30 )

Current Developments and Future Plans at NBF® Hyderabad and – Prospects for Long Duration Balloon Flights

Ravi Manchanda

Tata Institute of Fundamental Research, India

[m–5] Balloon Technologies

Session Date : 2009/7/9 14:00 – 16:20
Room : Room 202A
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<td>2009-m-20</td>
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<td>Highly Precise Pointing Control System on a Balloon-Borne Telescope</td>
<td>Yasuhiro Shoji¹, Tomoya Onishi¹, Steve Battazzo¹, Takeru Uno¹, Yuji Sakamoto¹, Yukihiro Takahashi¹, Kazuya Yoshida¹, Makoto Taguchi²</td>
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<td>for Optical Observations of Planets</td>
<td>¹Tohoku University, Japan, ²Rikkyo University, Japan</td>
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<tr>
<td>2009-m-21</td>
<td>14:20-14:40</td>
<td>Far-Infrared Interferometric Telescope Experiment (FITE): Three-Axis</td>
<td>Asami Nakashima¹, Hiroshi Shibai², Mitsunobu Kawada¹, Taro Matsuo², Masanao Narita³, Eri Kato², Tetsuo Kanoh², Tsunehito Kohyama¹, Yuka Matsumoto¹, Hirono Morishita¹</td>
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<td>Stabilized Attitude Control System</td>
<td>¹Nagoya University, Japan, ²Osaka University, Japan, ³JAXA/ISAS, Japan</td>
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<td>2009-m-22</td>
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<td>Development of a Simple Attitude Control System to Support the First</td>
<td>Yoshitaka Saito¹, Issei Iijima¹, Naoki Nonaka¹, Kazuhiko Yamada¹, Yuji Ishikawa², Makoto Kan’no², Yuji Kishimoto², Shuichi Gunji², Tetsuya Sato³, Tatehiro Mihara³</td>
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<td>Step of the Balloon Experiment</td>
<td>¹JAXA, Japan, ²Yamagata University, Japan, ³RIKEN, Japan</td>
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<td>2009-m-23</td>
<td>15:00-15:20</td>
<td>Development of New Telemetry and Command System for Scientific</td>
<td>Kazuhiko Yamada¹, Keisuke Tamura¹, Tetsuya Yoshida¹, Yoshitaka Saito¹, Hideyuki Fuke¹, Jiro Kawada¹, Atsushi Takada¹, Naoki Izutsu¹, Eiichi Mizuta¹, Massaki Nagahashi², Yoshio Tago³</td>
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<td>Balloon Flight</td>
<td>¹JAXA, Japan, ²Embedded Technology Corporation, Japan, ³ST Communication, Japan</td>
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<td>2009-m-24</td>
<td>15:20-15:40</td>
<td>Development of a Super-pressure Balloon with an Improved Design</td>
<td>Naoki Izutsu¹, Daisuke Akita¹, Hideyuki Fuke¹, Issei Iijima¹, Yoichi Kato¹, Jiro Kawada¹, Kiyoho Matsushima², Yukihiko Matsuzaka¹, Eiichi Mizuta¹, Takashi Nakada², Naoki Nonaka¹</td>
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<td>¹JAXA, Japan, ²Fujikura Parachute Company, Japan</td>
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<tr>
<td>2009-m-25</td>
<td>15:40-16:00</td>
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</table>
Balloons to be Launched at the Antarctic Pole

Jun Nishimura¹, Manabu Yamanaka²

¹ISAS, JAXA, Japan, ²JORGC/JAMSTEC & Kobe University, Japan

2009-m-26 (16:00–16:20)

Opening of the New Japanese Balloon Base at the Taiki Aerospace Research Field


JAXA, Japan

2009-m-27 (16:30–16:50)

Progress in BESS–Polar II Experiment and the Data Analysis

Kenichi Sakai

The University of Tokyo, Japan

2009-m-28 (16:50–17:10)

Observation of Polarization for the Crab Nebula with PHENEX Polarimeter

Yuji Kishimoto¹, Shuichi Gunji¹, Yushi Ishikawa¹, Makoto Takada¹, Tatehiro Mihara², Kiyoshi Hayashida³, Naohisa Anabuki³, Yoshitaka Saito⁴, Mitsuhiro Kohama⁴, Motoko Suzuki⁴

¹Yamagata University, Japan, ²RIKEN, Japan, ³Osaka University, Japan, ⁴JAXA/ISAS, Japan

2009-m-29 (17:10–17:30)

The Polarized Gamma-Ray Observer, PoGOLite

Hiromitsu Takahashi¹, on behalf of the PoGOLite collaboration²

¹Hiroshima University, Japan, ²Hiroshima University, Japan/SLAC, USA/Royal Institute of Technology, Sweden/Tokyo Institute of Technology, Japan/Stockholm University, Sweden/Ecole Polytechnique, France/Yamagata University, Japan/JAXA, Japan/University of Hawaii, USA/University of Tokyo, Japan

2009-m-30 (17:30–17:50)

FITE: Far-Infrared Interferometric Telescope Experiment
### [n-1] Earth Observation (1)

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<th>Session Date</th>
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<td>2009-n-01 (9:00-9:20)</td>
<td>Room 202A</td>
<td>Masanobu Shimada (JAXA, Japan), Daniel Gratton (Canadian Space Agency, Canada)</td>
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<td>2009-n-02 (9:20-9:40)</td>
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<td>2009-n-03 (9:40-10:00)</td>
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<td>2009-n-04 (10:00-10:20)</td>
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<tr>
<td>2009-n-05 (10:20-10:40)</td>
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#### 2009-n-01 (9:00-9:20)

**Title:** Radarsat Constellation, Project Status and Application to Disaster Monitoring  
**Speaker:** Guy Seguin  
**Institution:** Canadian Space Agency, Canada

#### 2009-n-02 (9:20-9:40)

**Title:** The Post-ALOS Program  
**Speakers:** Shinichi Suzuki, Yuji Osawa, Yasushi Hatooka, Tomohiro Watanabe  
**Institution:** JAXA, Japan

#### 2009-n-03 (9:40-10:00)

**Title:** Conceptual Design of an Optical Satellite for the Post-ALOS Program  
**Speakers:** Hiroko Imai, Haruyoshi Katayama, Tadashi Imai, Shinichi Suzuki, Yasushi Hatooka, Yuji Osawa  
**Institutions:** JAXA, Japan, Earth Observation Research Center (EORC), JAXA, Japan

#### 2009-n-04 (10:00-10:20)

**Title:** The Overview of the L-band SAR onboard ALOS-2  
**Speakers:** Yukihiro Kankaku, Yuji Osawa, Shinichi Suzuki, Tomohiro Watanabe  
**Institution:** JAXA, Japan

#### 2009-n-05 (10:20-10:40)

**Title:** System Outline of the Advanced Satellite with New System ARchitecture for Observation (ASNARO)  
**Speakers:** Kenichi Saito, Toshiaki Ogawa, Keita Miyazaki, Masatsugu Akiyama, Osamu Ito  
**Institutions:** NEC Corporation, Japan, Institute for Unmanned Space Experiment Free Flyer (USEF), Japan, New Energy and Industrial Technology Development Organization (NEDO), Japan
### Development of A High-resolution Optical Imager for Small Satellite

Shouji Morioka\(^1\), Seiji Kanda\(^1\), Hiroshi Irikado\(^1\), Katsuhiko Tsuno\(^1\), Kazuhiko Oono\(^1\), Tamio Nakashima\(^1\), Takashi Sakashita\(^1\), Yoshito Narimatsu\(^2\), Toshiaki Ogawa\(^2\), Shoichiro Mihara\(^3\), Osumu Ito\(^4\)

\(^1\)NEC TOSHIBA Space Systems, Ltd., Japan, \(^2\)Space Systems Division, NEC, Japan, \(^3\)USEF, Japan, \(^4\)NEDO, Japan

#### [n-2-s] Earth Observation (2)

**Session Date**: 2009/7/7 11:10 - 12:10  
**Room**: Room 202A  
**Chairpersons**: Makoto Omura (Kochi Women’s University, Japan)  
Masanobu Shimada (JAXA, Japan)

*The last letter “s” in the program number is the presentation(s) from Student Session.

#### 2009-n-07s (11:10-11:30)

**Soil Moisture Estimation Using Polarimetric SAR Data**

Laddawan Rianthakool  
*Asian Institute of Technology, Thailand*

#### 2009-n-08s (11:30-11:50)

**Link Budget and Coverage Study of GNSS-Reflectometry for Ocean Scatterometry**

Guy de Carufel  
*University of Toronto, Canada*

#### 2009-n-09s (11:50-12:10)

**Monitoring KOMPSAT-1 Image Degradation Using the Standardized Index of Image Interpretability**

Dongwook Kim  
*Inha University, Korea*

### [n-3] Earth Observation (3)

**Session Date**: 2009/7/7 14:00 - 16:00  
**Room**: Room 202A  
**Chairpersons**: Tamotsu Igarashi (JAXA, Japan)  
Yousuke Miyagi (JAXA, Japan)

#### 2009-n-10 (14:00-14:20)
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<tr>
<th>Title</th>
<th>Authors</th>
<th>Institution(s)</th>
<th>Date and Time</th>
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<tbody>
<tr>
<td>Breadboard Model of the On-orbit Calibration Equipment for Small Hyperspectral Sensor</td>
<td>Yoshihide Aoyanagi¹, Shin Satori¹, Yusuke Takeuchi²</td>
<td>¹Hokkaido Institute of Technology, Japan, ²Hokkaido Satellite, Inc., Japan</td>
<td>2009-n-11 (14:20-14:40)</td>
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<tr>
<td>On-Orbit Self-Compensation of Satellite Optics Using Spatial Light Modulator</td>
<td>Norihide Miyamura</td>
<td>The University of Tokyo, Japan</td>
<td>2009-n-12 (14:40-15:00)</td>
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<tr>
<td>Development of the Compact InfraRed Camera (CIRC) for Earth Observation</td>
<td>Haruyoshi Katayama, Masataka Naitoh, Masahiro Suganuma, Yoshihiko Okamura, Koji Nakau, Yoshi Tange</td>
<td>JAXA, Japan</td>
<td>2009-n-13 (15:00-15:20)</td>
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<td>Study on the Conical Scan Type Spaceborne Precipitation Radar</td>
<td>Kenichi Okamoto¹, Shoichi Shige², Takeshi Manabe²</td>
<td>¹Tottori University of Environmental Studies, Japan, ²Osaka Prefecture University, Japan</td>
<td>2009-n-14 (15:20-15:40)</td>
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<td>A Study of Disaster Mitigation and Reduction System Using Near Real-Time Small Satellite Constellation</td>
<td>Norishige Omoto¹, Hironori Kato¹, Yoshihiko Kameda¹, Koji Wakamori¹, Kenji Suzuki², Nozomu Nishinaga², Yuzo Suga³</td>
<td>¹Japan Manned Space Systems Corporation, Japan, ²NICT, Japan, ³Hiroshima Institute of Technology, Japan</td>
<td>2009-n-15 (15:40-16:00)</td>
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<td>The Operation Results of Earth Image Acquisition Using Extensible Flexible Optical Telescope of “PRISM”</td>
<td>Toshiki Tanaka, Yuki Sato, Yasuhiro Kusakawa, Kensuke Shimizu, Takashi Tanaka, Sang Kyun Kim, Mitsuhiro Komatsu, Ilyun Yoo, Lambert Caesy, Shinichi Nakasuka</td>
<td>University of Tokyo, Japan</td>
<td>2009-n-15 (15:40-16:00)</td>
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<td>Session Date</td>
<td>Short-arc Application for Antarctic Temporal Gravity Field Recovery from GRACE Mission</td>
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<td>2009-n-16</td>
<td>Jingshi Tang, Lin Liu, Xiyun Hou</td>
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<td>Nanjing University, China</td>
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<tr>
<th>Session Date</th>
<th>A GPS Study on Observing Earthquake Ground Displacement</th>
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<td>2009-n-17</td>
<td>Ching-Shun Ho¹, Chun-Hsiung Tsai²</td>
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<tr>
<td></td>
<td>¹National Cheng Kung University, Taiwan, ²Central Weather Bureau, Taiwan</td>
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<th>Session Date</th>
<th>Environmental Comparison between 1960’s Japan and 2000’s China by Satellite Images</th>
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<td>2009-n-18</td>
<td>Toshiro Sugimura¹, Kuniaki Isobe², Tetsuji Yamamoto³, Kunikazu Tanaka⁴</td>
</tr>
<tr>
<td></td>
<td>¹RESTEC, Japan, ²Asia Air Survey, Japan, ³Think Earth Science, Japan, ⁴GAC, Japan</td>
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<tr>
<th>Session Date</th>
<th>The Crop Evaluation Research for Environmental Strategies (CERES) Remote Sensing 2008 Project Activities</th>
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<tr>
<td>2009-n-19</td>
<td>Joseph Casas¹, John Glaser², Kenneth Copenhagen³, George May³</td>
</tr>
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<td></td>
<td>¹NASA, USA, ²U.S. Environmental Protection Agency, USA, ³Institute for Technology Development, USA</td>
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<th>Session Date</th>
<th>Increasing the Data from Small Satellites</th>
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<td>2009-n-20</td>
<td>Alex da Silva Curiel, Martin Pointer, Peter Gardner, Andrew Haslehurst</td>
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<td>Surrey Satellite Technology Ltd., UK</td>
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<th>Latest Results of Sofradir Infrared Detectors for Space Applications</th>
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<td>Anne Poupinet, Philippe Chorier, Aurelien Petit Dit Dariel, Laurent Vial, Yoanna-Reine Nowicki-Bringuier</td>
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<td>Sofradir, France</td>
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[n-5] Earth Observation (5)

Session Date : 2009/7/8 11:10 – 12:30
Room : Room 303
Chairpersons : Masanobu Shimada (JAXA, Japan)
Yoshihisa Hara (Mitsubishi Electric Corporation, Japan)

2009-n-22 ( 11:10-11:30 )
L-band SAR Monitoring River Conditions of the Shimanto River, Shikoku, Japan
Makoto Omura¹, Masanobu Shimada²
¹Kochi Women's University, Japan, ²JAXA, Japan

2009-n-23 ( 11:30-11:50 )
Production of DEM for Analysis of Microtopographical Features around Lake Balkhash by ALOS PRISM Data
Yasunori Nakayama, Shino Ogino
Nihon University, Japan

2009-n-24 ( 11:50-12:10 )
Satellite-based Monitoring of Environment for Human Securities
Tamotsu Igarashi
JAXA, Japan

2009-n-25 ( 12:10-12:30 )
Identification of Cloud and Precipitation for Over-ocean Rain Rate Estimates by the GSMaP Algorithm
Satoshi Kida¹, Shoichi Shige¹, Takeshi Manabe¹, Tristain LEcuyer², Guosheng Liu³
¹Osaka Prefecture University, Japan, ²Colorado State University, USA, ³Florida State University, USA

[p-1] Space Medicine and Physiology

Session Date : 2009/7/10 14:20 – 16:00
Room : Room 202B
Chairpersons : Chiaki Mukai (JAXA, Japan)
Shoji Oda (The University of Tokyo, Japan)

2009-p-01 ( 14:20-14:40 )
Check Out of On-orbit Digital Holter ECG and HDTV Camera Monitoring for Telemedicine
2009-p-02 (14:40–15:00)

Space Bone Loss and Prophylactic Use of Bisphosphonate for Station Astronauts

Hiroshi Ohshima¹, Shoichi Tachibana¹, Chiaki Mukai¹, Kenjiro Kohri², Toshitaka Nakamura³, Toshio Matsumoto⁴

¹JAXA, Japan, ²Nagoya City University, Japan, ³University of Occupational and Environmental Health, Japan, ⁴The University of Tokushima, Japan

2009-p-03 (15:00–15:20)

Psychological Support Program for JAXA ISS Long Duration Mission Astronauts

Natsuhiko Inoue, Shoichi Tachibana, Koji Yanagawa

JAXA, Japan

2009-p-04 (15:20–15:40)

Long-term Rearing of Medaka aboard ISS to Clarify the Trans-generation Effects in Vertebrates Induced by Cosmic Ray Irradiation

Shoji Oda¹, Yukie Higa¹, Toyoko Kuno¹, Yusuke Urushihara¹, Yasuhiro Kamei², Tomoko Ishikawa², Chiaki Mukai³, Takeshi Todo², Hiroshi Mitani¹

¹The University of Tokyo, Japan, ²Osaka University, Japan, ³JAXA, Japan

2009-p-05 (15:40–16:00)

Lunar Airborne Dust Problems for Moon Exploration

Takeo Miki¹, Yasuo Morimoto², Kazunari Tanaka¹, Toshiaki Higashi², Chiaki Mukai¹

¹JAXA, Japan, ²University of Occupational and Environmental Health, Japan

[p-2] Human Space Technology

Session Date: 2009/7/9 16:10 – 17:30
Room: Room 202B
Chairpersons: Masafumi Yamamoto (JAXA, Japan) Kunihiko Tanaka (Gifu University, Japan)

2009-p-07 (16:10–16:30)

Deformation Analysis of a Joint Structure Designed for Space Suit with the Aid of an Origami Technology

Kengo Ikema, Anna Gubarevich, Osamu Odawara
Tokyo Institute of Technology, Japan

2009-p-08 (16:30-16:50)

Usability of a Gas-pressurized Elastic Sleeves for Extravehicular Activity

Kunihiko Tanaka¹, Kenji Yamagata², Naoko Murakami², Chikara Abe¹, Hironobu Morita¹
¹Gifu University, Japan, ²JAXA, Japan

2009-p-09 (16:50-17:10)

Commercial Spaceport Development as an Enabler for Suborbital Human Spaceflight

Charles Lauer¹, David Faulkner¹, Misuzu Onuki²
¹Rocketplane Global, Inc., USA, ²Rocketplane Global, Inc., Space Frontier Foundation, Japan

2009-p-10 (17:10-17:30)

Training for Space Tourism—Consideration about Commercial Human Space Operations Training Standards from the Viewpoint of Non US Participants

Misuzu Onuki¹, Charles Lauer², Kent Adams³
¹Space Frontier Foundation, Japan, ²Rocketplane Global, Inc., USA, ³United Space Alliance, USA

[r-1-1] Solar Power Satellite and International Collaborations

Session Date : 2009/7/10 14:20 – 15:40
Room : Room 303
Chairpersons : Frank Little (Texas A&M University, USA)
Tatsuhito Fujita (JAXA, Japan)

2009-r-1-01 (14:20-14:40)

An Analytical Methodology for the Integration of the First International Assessment of Solar Energy from Space

John Mankins
Artemis Innovation Management Solutions LLC, USA

2009-r-1-02 (14:40-15:00)

Economic Analysis of Space Solar Power (SSP): Past and Present

A.C. Charania
SpaceWorks Engineering, Inc. (SEI), USA

2009-r-1-03 (15:00-15:20)

An Overview of Recent Experiments in Wireless Power Transmission
### 2009-r-1-04 ( 15:20–15:40 )

**Hawaii Demonstration on Microwave Power Transmission**

Nobuyuki Kaya\(^1\), Masashi Iwashita\(^1\), Frank Little\(^2\), Neville Marzwell\(^3\), John Mankins\(^4\)

\(^1\)Kobe University, Japan, \(^2\)Texas A&M University, USA, \(^3\)JPL, NASA, USA, \(^4\)Artemis Innovation Management Solutions, LLC, USA

### 2009-r-1-05 ( 15:50–16:10 )

**Overview of Studies on Large Structure of Space Solar Power Systems (SSPS)**

Tatsuhito Fujita, Susumu Sasaki, Yasuyuki Fukumuro

JAXA, Japan

### 2009-r-1-06 ( 16:10–16:30 )

**Technology Demonstration and Elemental Technology Development of Laser Based Space Solar Power System**

Hiroaki Suzuki, Katsuto Kisara, Susumu Sasaki

JAXA, Japan

### 2009-r-1-07 ( 16:30–16:50 )

**Autonomous Distributed Assembly Support and Fault Detection Method for Space Solar Power Satellite**

Kiyohiko Hattori, Keiki Takadama, Masayuki Otani

The University of Electro-Communications, Japan

### 2009-r-1-08 ( 16:50–17:10 )

**JAXA Astronaut Training Techniques**

Yumi Ohhama\(^1\), Takao Yamaguchi\(^1\), Kotaro Doyama\(^1\), Hideki Nagata\(^1\), Kazuharu Nara\(^2\), Naohiro Sato\(^2\), Satoshi Kawaguchi\(^2\), Takashi Yamasaki\(^3\)

\(^1\)JAXA, Japan, \(^2\)Japan Manned Space Systems Corporation (JAMSS), Japan, \(^3\)Space Engineering Development Co., Ltd. (SED), Japan
## Space Debris (1)

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<td>2009-r-2-01</td>
<td>9:00-9:20</td>
<td><strong>Micro-satellite Impact Testing</strong></td>
<td>Toshiya Hanada, Junko Murakami, Yoshihiro Tsuruda</td>
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<td>2009-r-2-02</td>
<td>9:20-9:40</td>
<td><strong>GEODEEM 4.0: Updated Model for Better Understanding GEO Debris Environment</strong></td>
<td>Yuya Ariyoshi, Toshiya Hanada</td>
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<td>Kyushu University, Japan</td>
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<td>2009-r-2-03</td>
<td>9:40-10:00</td>
<td><strong>Impact of Fengyun-1C Accident on the LEO Debris Population</strong></td>
<td>Kazuki Miyazaki, Kazuaki Maniwa, Toshiya Hanada</td>
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<td>Kyushu University, Japan</td>
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<td>2009-r-2-04</td>
<td>10:00-10:20</td>
<td><strong>Benefits of Active Debris Removal on the LEO Debris Population</strong></td>
<td>Kazuaki Maniwa, Toshiya Hanada</td>
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<td>Kyushu University, Japan</td>
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<td>2009-r-2-05</td>
<td>10:20-10:40</td>
<td><strong>The Response of Cable Harness Subjected to High Velocity Impact</strong></td>
<td>Kumi Nitta$^1$, Shirou Kawakita$^1$, Atsuhi Takeba$^2$, Masahide Katayama$^2$</td>
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<td>$^1$JAXA, Japan, $^2$CRC Solutions Corp., Japan</td>
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[r-2-2-s] Space Debris (2)

Session Date : 2009/7/7 10:50 – 11:30
Room : Room 405
Chairpersons : Tateo Goka (JAXA, Japan)
Yukihito Kitazawa (IHI, Japan)

*The last letter “s” in the program number is the presentation(s) from Student Session.

2009–r–2–09s ( 10:50–11:10 )

A Study on the Distribution of Dust Particles Trapped in a Horseshoe Orbit
Norizumi Motooka
University of Tokyo, Japan

2009–r–2–10 ( 11:10–11:30 )

Basic Characteristics of a Free-piston Driven Ballistic Range
Hideyuki Tanno, Tomoyuki Komuro, Masatoshi Kodera, Kazuo Sato, Masahiro Takahashi, Katsuhiro Itoh
JAXA, Japan

[r–2–3] Space Debris (3)

Session Date : 2009/7/7 14:00 – 15:20
Room : Room 405
Chairpersons : Toshiya Hanada (Kyushu University, Japan)
Yukihito Kitazawa (IHI, Japan)

2009–r–2–11 ( 14:00–14:20 )

TANPOPO: Astrobiology Exposure and Micrometeoroid Capture Experiments
Akihiko Yamagishi1, Hajime Yano2, Kyoko Okudaira3, Kensei Kobayashi4, Shin-ichi Yokobori1, Makoto Tabata5, Hideyuki Kawai5, Masamichi Yamashita2, Hiroshi Naraoka6, Hajime Mita7, Hirofumi Hashimoto2

1Tokyo University of Pharmacy and Life Science, Japan, 2ISAS/JAXA, Japan, 3University of Aizu, Japan, 4Yokohama National University, Japan, 5Chiba University, Japan, 6Okayama University, Japan, 7Fukuoka Institute of Technology, Japan

2009–r–2–12 ( 14:20–14:40 )

Analysis Results of Dusts from Micro-Particles Capturer on board Service Module of the International Space Station
Yugo Kimoto, Riyo Yamanaka
JAXA, Japan

2009–r–2–13 ( 14:40–15:00 )
## Optical Observational Facility of JAXA for Space Debris Observation and Its Activities

**Toshifumi Yanagisawa, Hirohisa Kurosaki, Atsushi Nakajima**

*JAXA, Japan*

2009–r–2–14 (15:00–15:20)

### Observation of Light Curve of GEO Debris etc.

**Hirohisa Kurosaki, Toshifumi Yanagisawa, Atsushi Nakajima**

*JAXA, Japan*

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<td>Room 405</td>
<td>Haruhisa Matsumoto (JAXA, Japan), Yugo Kimoto (JAXA, Japan)</td>
</tr>
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## [r–2–4] Space Debris (4)

### Spacecraft Survivability for Extended Mission Assurance under M/OD Environment

**Masayuki Ikeuchi**

*NEC TOSHIBA Space Systems, Ltd., Japan*


### Debris Impact on CFRP-AL Honeycomb Sandwich Structure

**Masumi Higashide¹, Yosuke Nagao¹, Seishiro Kibe¹, Alessandro Francesconi², Daniele Paverin²**

¹JAXA, Japan, ²University of Padova, Italy

2009–r–2–16 (15:50–16:10)

### Oblique Hypervelocity Impact Experiment for CFRP Plate

**Koji Tanaka¹, Jun Ueyama², Ichiro Shiota², Masumi Higashide³, Yasuhiro Akahoshi⁴, Susumu Sasaki³**

¹ISAS/JAXA, Japan, ²Kogakuin University, Japan, ³JAXA, Japan, ⁴Kyushu Institute of Technology, Japan

2009–r–2–17 (16:10–16:30)

### Survivability of Tether throughout Deorbiting

**Hiroshi Hirayama, Ieyoung Kim, Toshiya Hanada**

*Kyushu University, Japan*

2009–r–2–18 (16:30–16:50)
2009-r-2-19 (16:50-17:10)

Preliminary Study of Space Debris Removal Method with Electrostatic Force
Kazuhiro Toyoda, Yasunori Furukawa, Hirokazu Masui, Mengu Cho
Kyushu Institute of Technology, Japan

2009-r-2-20 (9:00-9:20)

Space Environment Measurement outside the International Space Station / Japanese Experimental Module (JEM)
Tateo Goka, Kiyokazu Koga, Haruhisa Matsumoto, Yugo Kimoto, Shoichi Ichihara, Noriko Yamada, Hideyuki Watanabe, Miho Endo, Daichi Sakoh, Tatsuo Matsueda, Takahiro Obara
JAXA, Japan

2009-r-2-21 (9:20-9:40)

Development of the Neutron Monitor onboard Space Environment Data Acquisition Equipment - Attached Payload (SEDA-AP)
Kiyokazu Koga\textsuperscript{1}, Haruhisa Matsumoto\textsuperscript{1}, Takahiro Obara\textsuperscript{1}, Tateo Goka\textsuperscript{1}, Yasushi Muraki\textsuperscript{2}
\textsuperscript{1}JAXA, Japan, \textsuperscript{2}Konan University, Japan

2009-r-2-22 (9:40-10:00)

Development of the Energetic Particle Spectrometer onboard Space Environment Data Acquisition Equipment Attached Payload (SEDA-AP)
Haruhisa Matsumoto, Kiyokazu Koga, Tateo Goka, Takahiro Obara
JAXA, Japan

2009-r-2-23 (10:00-10:20)

Observation Result of Radiation Environment from the Instrument onboard GOSAT
Yasutomo Sasaki\textsuperscript{1}, Takahiro Obara\textsuperscript{2}, Haruhisa Matsumoto\textsuperscript{2}
\textsuperscript{1}Mitsubishi Precision Co., Ltd./Space Electronics Dept., Japan, \textsuperscript{2}JAXA/SPACE Environment Group, Japan

2009-r-2-24 (10:20-10:40)

JAXA/CNES Joint Radiation Experiment onboard Jason-2 Satellite
### Space Environment (2)

**Session Date**: 2009/7/8 10:50 - 12:30  
**Room**: Room 405  
**Chairpersons**: Tateo Goka (JAXA, Japan)  
Tatsuto Komiyama (JAXA, Japan)

#### 2009-r-2-25 (10:50-11:10)

**The Variation of Equatorial Spread F Occurrences Observed by Ionosonde in Chumphon**  
Noraset Wichaipanich  
King Mongkut’s Institute of Technology Ladkrabang, Thailand

#### 2009-r-2-26 (11:10-11:30)

**Geosynchronous Satellites Anomalies on Geosynchronous Magnetopause Crossing**  
Susumu Tamaoki¹, Fumitaka Urayama¹, Satoshi Nozawa²  
¹Space Engineering Development Co., Ltd, Japan, ²Ibaraki University, Japan

#### 2009-r-2-27 (11:30-11:50)

**Forecast of Maximum Sunspot Number of Cycle 24**  
Shinichi Watari  
National Institute of Info. and Com. Tech., Japan

#### 2009-r-2-28 (11:50-12:10)

**Laboratory Simulation of levitation of Charged Lunar Dust Particles**  
Mengu Cho¹, Ayako Inoue¹, Teppei Okumura¹, Tetsuro Harada¹, Shinji Hatta², Kazuhiro Toyoda¹  
¹Kyushu Institute of Technology, Japan, ²MUSCAT Space Engineering Ltd., Japan

#### 2009-r-2-29 (12:10-12:30)

**Interaction of Spacecraft Anomalies with Space Environment**  
Takahiro Obara  
JAXA, Japan

### Satellite Environment
**Equivalent Circuit Design of Solar Array Panel for Transient Analysis of Spacecraft Surface Discharge**

Mengu Cho, Junji Maeshima, Kazuhiro Toyoda  
*Kyushu Institute of Technology, Japan*

**Development of ESD Ground Test System for Controlling Discharge Current and Position**

Kazuhiro Toyoda, Masayuki Nomura, Yuta Sakamoto, Hirokazu Masui, Mengu Cho  
*Kyushu Institute of Technology, Japan*

**Research on Mitigation Method against Secondary Arcing on Solar Array**

Tomohiro Wada  
*Kyushu Institute of Technology, Japan*

**Spacecraft Charging Mitigation through the Field Emission by Electron-emitting Film**

Arifur Khan\(^1\), Hideyuki Igawa\(^1\), Tepppei Okumura\(^1\), Minoru Iwata\(^1\), Kazuhiro Toyoda\(^1\), Shinji Hatta\(^2\), Tatsuhiito Fujita\(^3\), Yoshihumi Mizuguchi\(^4\), Mengu Cho\(^1\)  
\(^1\)Kyushu Institute of Technology, Japan, \(^2\)MUSCAT Space Engineering Co. Ltd., Japan, \(^3\)JAXA, Japan, \(^4\)Fuchigami Micro Co. Ltd., Japan.
# Small Satellite

**Session Date**: 2009/7/10 9:00 - 11:00  
**Room**: Room 202B  
**Chairpersons**: Yuichi Tsuda (JAXA, Japan)  
Shigeru Aso (Kyushu University, Japan)

*This session is Student Session*

## 2009-s-01f (9:00-9:20)

**Preliminary Design of Mother and Daughter Microsatellite System**  
Sota Inomata  
*Tokyo Metropolitan University, Japan*

## 2009-s-02f (9:20-9:40)

**Research and Development of an Attitude Control System for Osaka Institute of Technology Electric-Rocket-Engine onboard Small Space Ship**  
Tomoyuki Ikeda  
*Osaka Institute of Technology, Japan*

## 2009-s-03u (9:40-10:00)

**University of Tokyo Nano Satellite Project PRISM**  
Kensuke Shimizu  
*University of Tokyo, Japan*

## 2009-s-04j (10:00-10:20)

**Negai a Soka University Picosatellite**  
Tomohito Yamada  
*University of Soka, Japan*

## 2009-s-05f (10:20-10:40)

**Progress of Project of Osaka Institute of Technology Electric-Rocket-Engine onboard Small Space Ship**
2009-s-06t (10:40-11:00)

Optimization for the Communication Network of a Micro-satellite Cluster by the Multilayer Hierarchy via a Genetic Algorithm

Koki Ho
The University of Tokyo, Japan

[s-2] Planet Climate, Sensor and Device

Session Date: 2009/7/10 11:10 – 12:30
Room: Room 202B
Chairpersons: Kimiya Komurasaki (The University of Tokyo, Japan)
Hiroyuki Ogawa (JAXA, Japan)

*This session is Student Session

2009-s-07k (11:10-11:30)

Time-variable Surface Patterns as an Indicator of the Surface Environments on Mars

Takenori Toyota
The University of Tokyo, Japan

2009-s-08m (11:30-11:50)

Development of a Low-energy, Heavy Neutral Particle Sensor for Artificial Energetic Neutral Atoms Detection

Takuya Ogawa
Shizuoka University, Japan

2009-s-09j (11:50-12:10)

Robust and Compact Beacon Transmitter for Nanosatellites

Amee Shah
University of Toronto Institute for Aerospace Studies, Canada

2009-s-10r-1 (12:10-12:30)

Study of CO₂ Reduction Device by Using Sabatier Reaction

Koshiro Usuku
Waseda University, Japan
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<td>Masafumi Katahira (JAXA, Japan) Akira Ogawa (JAXA, Japan)</td>
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2009-t-01 (10:00–10:20)

**Deadlock Avoidance by Task Transfer among Multiple Robots in Large-scale Structure Assembly**

Masayuki Otani, Kiyohiko Hattori, Keiki Takadama  
*The University of Electro-Communications, Japan*

2009-t-02 (10:20–10:40)

**CNAPS: A Novel Propulsion System for the CanX-4 & CanX-5 Nanosatellite Mission**

Mohamed Ali, Stephen Mauthe, Freddy Pranajaya  
*University of Toronto, Canada*

2009-t-03 (10:40–11:00)

**Multidisciplinary Optimization of Interplanetary Trajectory and Equipment Mass Distribution for Space Vehicle**

Tomokazu Konno, Takeshi Tsuchiya  
*The University of Tokyo, Japan*

2009-t-04 (11:00–11:20)

**Introduction and the Outline of the ASNARO Project (Advanced Satellite with New System ARCHitecture for Observation)**

Koichi Ijichi¹, Toshiaki Ogawa², Osamu Itoh³  
¹Institute for Unmanned Space Experiment Free Flyer (USEF), Japan, ²NEC Corporation, Japan, ³The New Energy and Industrial Technology Development Organization (NEDO), Japan

2009-t-05 (11:20–11:40)

**System Design and Project Management for University Satellites**

Yoshihiro Tsuruda, Toshiya Hanada, Jozef van der Ha  
*Kyushu University, Japan*

2009-t-06 (11:40–12:00)

**System Engineering Approach to A New Micro Satellite for Asia Pacific, M-STAR**

Masanobu Tsuji  
*JAXA, Japan*
[u-1] Space Education and Outreach (1) Human Activity and Culture

Session Date : 2009/7/10 10:30 – 12:10
Room : Room 202A
Chairpersons : Seiichi Sakamoto (JAXA, Japan)
               Jean Souchay (Observatoire de Paris, France)

2009-u-01 (10:30–10:50)
Demonstration Experiments Related to Physical Space Sciences
Ranga Narayanan
University of Florida, USA

2009-u-02 (10:50–11:10)
Space Kona Coffee Project for Local Outreach A Case Study of Public Awareness and Regional Culture in Space
Misuzu Onuki1, Charles Lauer2, David Bateman3, Lloyd French4
1Space Frontier Foundation, Japan, 2Rocketplane Global, Inc, USA, 3Heavenly Hawaiian Fam Ltd., USA, 4University of Hawaii at Manoa, USA

2009-u-03 (11:10–11:30)
Space Education in the Young Astronauts Club Yokohama Chapter
Toshiaki Takemae
JAXA, Japan

2009-u-05 (11:30–11:50)
Espace dans Ma Ville: When the Heart of Suburbs Beats to the Rhythm of Space Discoveries
Christophe Sciouna1, Aline Chabreuil2, Elodie Regnier1, Nicolas Chaleroux1
1Planete Sciences, France, 2CNES, France

2009-u-17 (11:50–12:10)
Importance of International Education for International Cooperation –Activities and Contributions of the International Space University
Yoshiki Morino, Walter Peeters
International Space University (ISU), France

[u-2] Space Education and Outreach (2) ISS and Satellite
### Session Date: 2009/7/10 14:20 – 16:00
**Room:** Room 202A  
**Chairpersons:** Misuzu Onuki (Space Frontier Foundation, Japan)  
Ranga Narayanan (University of Florida, USA)

#### 2009–u–06 (14:20–14:40)
**Educational Experiments with a Low Grvity Device, Ez–Space2**

Ryojiro Akiba\(^1\), Takemasa Koreki\(^2\), Ikuo Egami\(^3\), Masamichi Yamashita\(^4\)

\(^1\)USEF/HASTIC, Japan, \(^2\)IA/HASTIC, Japan, \(^3\)Uchusen/HASTIC, Japan, \(^4\)ISAS/JAXA Japan

#### 2009–u–07 (14:40–15:00)
**HANA-densetsu, An ISS Cultural/Educational Utilization**

Yoichi Hasegawa\(^1\), Kaori Tomita–Yokotani\(^2\), Masamichi Yamashita\(^3\)

\(^1\)Japan Manned Space Systems Corporation (JAMSS), Japan, \(^2\)Tsukuba University, Japan, \(^3\)JAXA, Japan

#### 2009–u–08 (15:00–15:20)
**HanaFlora and Demoiselle : Passports to the Space Community**

Guy Pignolet\(^1\), Domitian Popescu\(^2\)

\(^1\)Science Sainte–Rose, Reunion, \(^2\)University of La Reunion

#### 2009–u–09 (15:20–15:40)
**Design and Manufacture a Pico Satellite for Education Purpose**

Huy Le, P. A. Tuan, N. T. Thanh, P. M. Quan, H. X. Quang, H. T. Huynh, T. M. Duc, D. C. Huan

Space Technology Institute (STI), Vietnam Academy of Science and Technology (VAST), Vietnam

#### 2009–u–10 (15:40–16:00)
**Proposal of “Ig Satellite Design Contest” and Its Expected Effect**

Hironori Sahara\(^1\), Satoshi Hosoda\(^2\), Yoshiki Sugawara\(^3\), Nakano Masakatsu\(^4\), Shinichi Nakasuka\(^5\)

\(^1\)Tokyo Metropolitan University, Japan, \(^2\)JAXA, Japan, \(^3\)Aoyama Gakuin University, Japan, \(^4\)Tokyo Metropolitan College of Industrial Technology, Japan, \(^5\)University of Tokyo, Japan

### [u–3] Space Education and Outreach (3) Space and Astronomy

**Session Date:** 2009/7/10 16:10 – 17:30  
**Room:** Room 202A  
**Chairpersons:** Makoto Yoshikawa (JAXA, Japan)  
Guy Pignolet (Science Sainte–Rose, Reunion)
2009–u–11 (16:10–16:30)

A Contest for Student Space Experimental Flights by Suborbital Space Vehicle

Misuzu Onuki\(^1\), Charles Lauer\(^2\), Kenichi Ito\(^3\), Osamu Fujita\(^4\)

\(^1\)Space Frontier Foundation, Japan, \(^2\)Rocketplane Global, Inc, USA, \(^3\)HASTIC, Japan, \(^4\)Hokkaido University, Japan

2009–u–12 (16:30–16:50)

International Year of Astronomy 2009 – JAXA’s Activity

Seiichi Sakamoto

JAXA, Japan

2009–u–13 (16:50–17:10)

KAGUYA(SELENE) Education and Public Outreach activity

Shinichi Sobue\(^1\), Susumu Sasaki\(^1\), Manabu Kato\(^1\), Seiichi Sakamoto\(^1\), Hirokazu Hoshino\(^1\), Hayato Okumura\(^1\), Aya Yamamoto\(^2\),Takeo Fujita\(^2\)

\(^1\)JAXA, Japan, \(^2\)RESTEC, Japan

2009–u–14 (17:10–17:30)

Education and Outreach by Using Spaceguard

Makoto Yoshikawa\(^1\), Noritsugu Takahashi\(^2\)

\(^1\)JAXA, Japan, \(^2\)Japan Spaceguard Association, Japan

Poster Session

Session Date : 2009/7/9 18:30 – 20:00
Room : 2F Corridor

2009–b–58p

Study of 5cm Size Microwave Discharge Ion Thruster

Yoshiyuki Takao\(^1\), Hideki Nakashima\(^2\), Naoji Yamamoto\(^2\)

\(^1\)Nishinippon Institute of Technology, Japan, \(^2\)Kyushu University, Japan

2009–b–59p

Effect upon the Sputtering Threshold due to the Accumulation of Projectiles in Target Material

Takahiro Kenmotsu\(^1\), Motoi Wada\(^1\), Masaki Nishiyama\(^1\), Toru Hyakutake\(^2\), Tetsuya Muramoto\(^3\), Michio Nishida\(^4\)

\(^1\)Nishinippon Institute of Technology, Japan, \(^2\)Kyushu University, Japan, \(^3\)Hokkaido University, Japan, \(^4\)Hokkaido University, Japan
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<td>1</td>
<td>The Difference between Anode Shapes in an Anode-layer Type Hall Thruster</td>
<td>Shigeru Yokota, Kentaro Hara, Shinatora Cho, Kimiya Komurasaki, Yoshihiro Arakawa</td>
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<td>2</td>
<td>Space Environment and its Effects of Micro-Particles Capturer and Space Environment Exposure Device on board Japanese Experiment Module Exposed Facility</td>
<td>Yugo Kimoto, Shoichi Ichikawa, Eiji Miyazaki, Hiroyuki Shimamura</td>
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<td>Enthalpy Distributions of Laser Driven Inductively Coupled Plasma Generator Flows</td>
<td>Makoto Matsui, Suisei Yamagishi, Kimiya Komurasaki, Yoshihiro Arakawa</td>
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<td>Beamed Energy Propulsion to Launch Solar Power Satellites</td>
<td>Jonathan Coopersmith</td>
<td>Tokyo Institute of Technology/Texas A&amp;M University, Japan</td>
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<td>5</td>
<td>Rain Attenuation on Satellite to Ground Link for Beacon Signal</td>
<td>Yee Hui Lee, Jun Xiang Yeo, Jin Teong Ong</td>
<td>Nanyang Technological University, Singapore</td>
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<td>Akiko Nakazawa, Taiichiro Okubayashi, Hideki Mori, Takanori Maesako, Osamu Morikawa, Masahiro Nakao, Naoya Tomii, Tomonori Kuroda, Tetsuo Sato, Teruo Kawasugi, Gousei Hashimoto</td>
<td>Osaka University, Japan, National Institute of Advanced Industrial Science and Technology, Japan, JAXA, Japan, Space Engineering Development Co., Ltd., Japan</td>
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1Doshisha University, Japan, 2Okayama University, Japan, 3Okayama University of Science, Japan, 4Sojo University, Japan
Laboratory Calibration Measurements of Mercury Dust Monitor for BepiColombo Mission

Seiji Takechi¹, Ken-ichi Nogami², Takashi Miyachi³, Masayuki Fujii³, Takeo Iwai⁴, Sho Sasaki⁵, Hideo Ohashi⁶, Hiromi Shibata⁷, Eberhard Guruen⁸, Ralf Srama⁸

¹Osaka City University, Japan, ²Dokkyo University School of Medicine, Japan, ³Waseda University, Japan, ⁴The University of Tokyo, Japan, ⁵National Astronomical Observatory of Japan, Japan, ⁶Tokyo University of Marine Science and Technology, Japan, ⁷Kyoto University, Japan, ⁸Max-Planck-Institute for Nuclear Physics, Germany

2009-k-50p

A Development of Waveform Receivers Using Digital down Converter Chip

Tomonori Koshida¹, Takayuki Ono¹, Masahide Iizima², Atsushi Kumamoto¹

¹Tohoku University, Japan, ²Shukutoku University, Japan

2009-k-51p

Effect of Heating and Cooling on the Piezoelectric Properties of a PZT sensor for Mercury Dust Monitor

Takeo Iwai¹, Maki Nakamura¹, Hideo Ohashi², Hiromi Shibata³, Takashi Miyachi⁴, Seiji Takechi⁵, Hajime Yano⁶, Sho Sasaki⁷, Masayuki Fujii⁸, Ken-ichi Nogami⁹

¹The University of Tokyo, Japan, ²Tokyo University of Marine Science and Technology, Japan, ³Kyoto University, Japan, ⁴Waseda University, Japan, ⁵Osaka City University, Japan, ⁶JAXA, Japan, ⁷National Institutes of Natural Sciences, Japan, ⁸FAM Science Co. Ltd., Japan, ⁹Dokkyo Medical University, Japan

2009-k-52p

Development and Testing of an Atmosphere Revitalization System for Moon Base

Naoko Nakayama, Masato Sakurai, Shoichi Yoshihara, Yoshitsugu Sone, Mitsuru Ohnishi

JAXA, Japan

2009-k-53p

System Analysis and Orbit Design for PLANET-C Venus Climate Orbiter

Nobuaki Ishii¹, Masato Nakamura¹, Takeshi Imamura¹, Takumi Abe¹, Masafumi Kimura², Takeshi Ohshima²

¹JAXA, Japan, ²NEC (Nihon Electric Co. Ltd), Japan

2009-m-31p

Scientific Ballooning in Brazil

Jose Fernandes, Elisete Rinke, Luiz Carlos de Almeida, Nilton Reno
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<td>David Lopez</td>
<td>Papua New Guinea University of Technology, Papua New Guinea</td>
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<td>Flood Disaster Monitoring by ALOS/PALSAR: Latest Results</td>
<td>Masato Ohki, Masanobu Shimada, Osamu Isoguchi, Noriyuki Kawano</td>
<td>JAXA, Japan</td>
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<td>Akiko Matsumoto, Kazunari Tanaka, Chiaki Mukai</td>
<td>JAXA, Japan</td>
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<td>Yukiko Endo, Shizu Yabe, Yu Koike, Shoichi Tachibana, Maki Akioka, Tsutomu Nagatsuma, Shunji Takagi, Satoshi Iwai, Aiko Nagamatsu, Keiji Murakami</td>
<td>JAXA, Japan, NICT, Japan, MRLINC, Japan</td>
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<td>Comparison of Estimation Using Debris Environment Models for International Standardization</td>
<td>Naoyuki Tahara, Yasuhiro Akahoshi, Yakihiro Kitazawa, Takeo Gota, Masato Uchino, Hiroto Nagai</td>
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Threshold of Sustained Arc due to Space Debris Impact on Solar Array

Kazuhiro Aso¹, Toshikazu Nagasaki¹, Yasuhiro Akahoshi¹, Keiko Watanabe², Kenshou Sugahara¹, Masato Fukuyama¹, Takao Koura¹, Mengu Cho¹, Hiroto Nagai³

¹Kyushu Institute of Technology, Japan, ²JAXA, Japan, ³Nippon Bunri University, Japan

Development of Four-Stage Light Gas Gun

Yasutaka Otsuji¹, Yasuhiro Akahoshi¹, Takao Koura¹, Hiroto Nagai², Satoshi Iima¹, Hiroshi Takakura¹

¹Kyushu Institute of Technology, Japan, ²Nippon Bunri University, Japan

Evaluation of Electrostatic Charging Properties of Insulating Materials Used for Spacecrafts by Means of Electron Beam Irradiation

Haruhisa Fujii

Nara National College of Technology, Japan

Characterization of Lubricative Coatings after Exposure Test in ISS Orbit

Masahiro Tosa, Akira Kasahara, Masahiro Goto

National Institute for Materials Science, Japan

Development of a New Type Sensor for Micrometeoroid and Space Debris In-Situ Measurement at JAXA

Yukihiro Kitazawa¹,²,³, A. Sakurai⁴, T. Yasaka⁵, K. Funakoshi⁴, T. Hanada⁶, H. Matsumoto²

¹IHI, Japan, ²JAXA, Japan, ³National Institute of Information and Communications Technology (NiICT), Japan, ⁴Institute for Q-shu Pioneers of Space, Inc. (iQPS), Japan, ⁵Institute for Q-shu Pioneers of Space, Inc. (iQPS), Japan / Kyushu University, Japan, ⁶Kyushu University, Japan

Astronomy is Used as the Astrological Practices in Mongolia

Bayartungalag Batsaikhan
Production of a New Type of Telescope

Norio Okamura, Ryouko Ishikawa, Shiho Ishii, Yukiko Hirayama

Mito Daini High School, Japan