

EUROPEAN SPACE MECHANISMS & TRIBOLOGY SYMPOSIUM

Final Symposium Programme ESMATS-13, 2009, in Vienna

Tuesday 22nd September

17:00 - 19:00 Pre-registration at the Herrensaal (opposite to the Palais), Vienna

Wednesday 23rd September

08:30 - 09:15 Registration at the Palais Ferstel, Vienna
(Exhibitors installation 8:00 to 09.00)

08:00 - 09:00 Authors breakfast in the Café Central (downstairs of the palais)

Opening Session

Session introduction: M. Falkner (ESA/ESTEC, NL)

09:15 - 09:45 Max Kowatsch (CEO RUAG Space GmbH, AUT)
Constantinos Stavrinidis (Head of ESA Mechanical Engineering Department, NL)
Andre Borrien (Co-Chairman, CNES deputy sub-director for spacecraft technologies, design, and integration, F)
Gerard Migliorero (Chairman, Head of ESA Mechanisms Section, NL)

09:45 - 10:00 **Invited Speaker 1:**
Technology and Product Development as an Indispensable Tool for Space Activities- An Agency Point of View
Harald Posch (Head of Austrian Aeronautics and Space Agency and present chairman of the ESA Industrial Policy Committee (IPC), AUT)

10:00 - 10:30 **Invited Speaker 2:**
Meteosat Third Generation (MTG): Status and Mechanisms Challenges
Donny Aminou (Optical Instrument Scientist, ESA MTG Payload Manager, NL)

10:30 - 11:00 Coffee break

Session 1: Mechanism Components (1)

Chairman: C. Neugebauer (RUAG Space GmbH, AUT)

11:00 - 11:20 **High Load Low Shock Release Unit (30kN)**
Müller, J.; Anderau, C.

11:20 - 11:40 **SARM a Solar Array Rotation Mechanism**
Doejaeren, F.

11:40 - 12:00 **Development of an European Eddy Current Damper (ECD-100)**
Hofer, M.; Humphries, M.E.

12:00 - 12:20 **Dynamic Behaviour of Locking Mechanism of Microaccelerometer**
Patocka, K.; Jamroz, T.; Had, J.

12:20 - 13:20 Lunch

Session 2: Pointing & Deployment Mechanisms (1)

Chairman: J. Murer (KDA, NOR)

13:20 - 13:40 **Extremely Compact Two Axis X-Band Antenna Downlink**
Schmid, M.; Yong, S.; Lee, S.

13:40 - 14:00 **Electric Propulsion Pointing Mechanism Hold Down & Release Mechanism Design and Breadboard Test Results**
Janu, P.; Neugebauer, C.; Falkner, M.; Supper, L.; Mitterbauer, G.; Weinhappl, H.; Traxler, G.

14:00 - 14:20 **Thruster Pointing Mechanism Qualification Test Results**
Nitschko, T.; Traxler, G.; Mitterbauer, G.; Zemann, J.; Falkner, M.; Lautier, J-M.; Rigollet, R.

- 14:20 - 14:40 **Development of a Compact Ka-Band Antenna Pointing Mechanism for Intersatellite Links on Small Satellites**
Pfeiffer,Matthias; Harder,Jan; Walter,Ulrich;
- 14:40 - 15:00 Poster session / Coffee break

Session 3: Tribology (1)

Chairman: A. Merstallinger (AIT, AUT)

- 15:00 - 15:20 **Tribolab: An Experiment on Space Tribology. In-Orbit Data at the ISS**
Brizuela,M.; García-Luis,A.; Onate,J.I.; Garmendia,I.
- 15:20 - 15:40 **The Friction and Wear Properties of Thermally Conditioned PGM-HT**
Buttery,M.; Anderson,M.;
- 15:40 - 16:00 **PGM-HT as RT/5813 Duroid Replacement: Lifetime Results on STD Earth Scanning Sensor and POLDER Bearing Shaft**
Sicre, J.; Michel,Y.; Videira,E.; Nicoller,L.; Baud,D.
- 16:00 - 16:20 **Tribology Aspects of the NIRSPEC Filter and Grating Wheel Mechanisms**
Ellenrieder,M.; Weidlich, K.; Groß,T.; Fischer,M.; Kolb,A.; Wieland,H.; Trunz, M.
- 16:20 - 17:20 Extended Poster session / Coffee break

Session 4: Simulation

Chairman: H. Cruyssen (Dutch Space, NL)

- 17:20 - 17:40 **Mechanism Noise Signatures: Identification and Modelling**
Seiler,R.; Allegranza,C.
- 17:40 - 18:00 **Multi-body Dynamics Software Tool: Two Case Studies**
Smet, G.; Yorck, M.; Baldesi, G.; Palladino, M.
- 18:00 - 18:20 **Novel Fault Tolerant Robotic System for Mars Rover**
Mumm,E.; Rutberg,M.; Kennedy,T.; Nolan,T.; Sheppard,D.; Ji,J.; Gorevan,S.
- 18:20 - 18:40 **Architecture and Deployment of a High Power Solar Array**
Carpine,A.; Verne,C.; Rinn,C.; Martin,C.
- 19:00 - 21:00 Cocktail reception at Palais Ferstel

Thursday 24th September

- 08:00 - 09:00 Authors breakfast in the Café Central (downstairs of the palais)
- 08:30 Palais Ferstel opens for 2nd day

Session 5: Pointing & Deployment Mechanisms (2)

Chairman: E. Boesiger (LMMS, USA)

- 09:00 - 09:20 **Antenna Despin Mechanism for Bepi Colombo**
Schmid,M.; Kawamura, T.; Hehr,C.; Rapp, U.
- 09:20 - 09:40 **Problems Encountered During the Recertification of the GLORY Dual Axis Solar Array Gimbal Drive Actuators**
Saltzman,M.; Schepis,J.; Bruckner,M.
- 09:40 - 10:00 **Optical Communications Terminals with Precise Pointing**
Frame,T.; Pechev,A.;
- 10:00 - 10:20 **Development of the LID Opening Mechanism "LOM"**
Schmid,B.; Flüeli,P.; Houghton,P.; Blum,D.
- 10:20 - 11:20 Extended Poster session / Coffee break

Session 6: Science & Exploration Mechanisms (1)

Chairman: F. Di Gesu (Astrium Satellites, F)

- 11:20 - 11:40 **GOCI (Geostationary Ocean Colour Imager) Mechanisms**
Salaun,T.; Di Gesu,F.; Blais,T.
- 11:40 - 12:00 **CHEMCAM Screw/Nut Autofocus Mechanism: Qualification Data and Guidelines for Space use of Ground Equipments**
Michel,Y.; Condé,E.; Kouach,D.; Simpendoerfer, M.; Parof,Y.; Orttner,G.; Saccoccio,M.; Maurice,S.
- 12:00 - 12:20 **Testing and Lessons Learnt of LISA GPRM**
Neukom,A.; Romano, R.; Nellen,P.
- 12:20 - 12:40 **Design and Development of the Point-Ahead Angle Mechanism for the Laser Interferometer Space Antenna (LISA)**
Heinein,S; Spanoudakis,P; Schwab,Ph; Kielberg,I.; Giriens,L.; Welte, Y.; Dassa,L; Greger, R.; Langer, U.
- 12:40 - 13:40 Lunch

Session 7: Tribology (2)

Chairman: S. Lewis (ESTL/ESR, UK)

- 13:40 - 14:00 **Power and Signal Transfer Technology for High Temperature Applications**
Fink,M.; Merstallinger,A.; Uschan,D.; Eder,J.; Rehder,J.; Holzapfel,Ch.; Seiler,R.
- 14:00 - 14:20 **Tribo-Component Testing of Self Lubricating Copper Composites at Medium Temperatures in Space**
Merstallinger,A.; Fink,M.; Neubauer,E.; Gaillard,L.; Pambaguian,L.; Anderson,M.; Roberts, E.
- 14:20 - 14:40 **Spiral-Orbit Tribometer Assessment of Space Lubricants**
Buttery,M.
- 14:40 - 15:00 **Reduction of Cold Welding by Geometric Parameters**
Merstallinger,A.; Sales,M.; Semerad,E.; Dunn,B.D.
- 15:00 - 15:20 Poster session / Coffee break

Session 8: Mechanism Components (2)

Chairman: M. Falkner (ESA/ESTEC, NL)

- 15:20 - 15:40 **Linear Magnetic Actuators for Fine Positioning**
Bencheikh,N.; Le Letty,R.; Claeysen,F.; Migliorero,G.;
- 15:40 - 16:00 **High Precision Linear Actuator Development**
Santos,I.; Migliorero,G.
- 16:00 - 16:20 **A Low-Noise, High-Bandwidth Magnetically-Levitated Momentum-Wheel for 3-Axis Attitude Control from a Single Wheel**
Seddon,J.; Pechev, A.
- 16:20 - 16:40 **Reaction Sphere for Attitude Control**
Onillon,E.; Chélat,O.; Rossini, L.; Lisowski,L.; Droz,S.; Moerschell,J.
- 16:40 - 17:40 Invited Speaker 3:
We are the center of the Universe - What are we searching in Space?
Professor Rudolf Taschner (Institute für Analysis und Scientific Computing, TU Vienna, and math.space, Vienna)
- 18:30 Coaches depart from Palais Ferstel to Technical Museum, Vienna
- 19:00 - 22:00 Welcoming Reception & Symposium Dinner at the Technical Museum, Vienna (including A. Merstallinger playing Piano)
Please advise the local organiser as soon as possible if you have any special dietary requirements.

Friday 25th September

08:00 - 09:00 Authors breakfast in the Café Central (downstairs of the palais)

08:30 Palais Ferstel opens for 3rd day

Session 9: Launchers & Re-Entry

Chairman: P. Tatiossian (CNES, F)

09:00 - 09:20 **Performances of Linear Electro Mechanic Actuators (EMA) for the International Berthing and Docking Mechanism (IBDM)**
Urgoiti,E.; Hurtado,E.; Gabiola,I.

09:20 - 09:40 **Electrically Actuated Hot Gas Valve for Liquid Propellant Rocket Engine**
Thomas,V.; Bomal,J.

09:40 - 10:00 **Shape Memory Alloy Actuator based Satellite Separation Device using Plastic Deformation**
Tak, L.; Lee, M.; Kim, B.

10:00 - 10:20 **An Electrical Thrust Vector Control System for the VEGA Launcher**
Vanthuyne,T.

10:20 - 10:40 **Design and Development of the Nozzle Deployment Mechanism for the Vinci Cryogenic Engine**
Strøm, S.; Krabberød, J.; Condaminet, O.
(note this paper is not on the CD and can be downloaded from the ESMATS homepage after the symposium)

10:40 - 11:00 Poster session / Coffee break

Session 10: Science & Exploration Mechanisms (2)

Chairman: S. Michaud (RUAG Space AG, CH)

11:00 - 11:20 **NIRSpec Wheel Support Mechanisms` Central Duplex Bearing Cryogenic Test Results**
Neugebauer,C.; Supper,L.; Watters, R.; Roberts, E.; Demaret, C.

11:20 - 11:40 **Wheel Mechanisms of the Mid-Infrared Instrument Aboard the James Webb Space Telescope - Performance of the Flight Models**
Krause,O.; Müller,F.; Scheithauer,S.; Hofferbert, R.: et al

11:40 - 12:00 **The Cryogenic Refocusing Mechanism of NIRSpec - Design Validation by Testing of the Qualification and Life Test Models**
Di Giampietro,M.; Capo,G.; Caprini,G.C.; Pompei,C.; Taccola,M.; Tarchi,F.; Suetta,E.;

12:00 - 12:20 **FGS Ground Testing Prior to Long-Term Operation in Orbit about L2**
Heald,J.; O Grady,M.

12:20 - 12:40 **Conclusions - Closing remarks on ESMATS-13**
G. Migliorero (ESA/ESTEC, NL)

12:40 - 13:40 Lunch

14:00 - 17:00 Coach departs from Palais Ferstel for technical visit to RAA (Berndorf, will go to via Vienna Airport on the way back to the Palais, estimated arrival at VIE is around 17:00, note that the number of participants is limited to 50 persons)

14:00 - 17:00 Coach departs from Palais Ferstel for technical visit to ARC (Seibersdorf, will go to via Vienna Airport on the way back to the Palais, estimated arrival at VIE is around 17:00, note that the number of participants is limited to 50 persons)

POSTERS

- P-01 **Adjustable Large Range Rotary Deployment Damper**
Mitter,W.; Zemann,J.; Nitschko,T.; Neugebauer,C.; Mitterbauer,G.; Palladino,M.
- P-02 **Conceptual Design of the Separation System of the International Berthing and Docking Mechanism**
Smet,G.; Vrancken,D.; Vandepitte,D.; Steelant,J.
- P-03 **Deployment of appendices using "MAEVA" hinges: progress in dynamic models**
Lathuilliere,M.; Sicre,J.; Germain,F.
- P-04 **Development of an Actuator for Solar-Array Deployment**
Boesch,C.; Langer, U.; Zahnd,B.; Bonduelle,B.
- P-05 **Development of an Adjustable Bearing Preload-Enabled Optical Terminal**
Lewis,S.D.; Munro,G.; Humphries,M.E.; Székely,G.
- P-07 **Dynamic Modelling of the Bepi-Colombo Separation System**
Shiell, J.; Canty, P.; Kiley, A.; Gibson, A.
- P-08 **Experimental Study of dual-reciprocating-drilling Mechanism using Design of Experiment Approach**
Gouache,T.; Gao,Y.; Coste,P.; Gourinat,Y.
- P-10 **Influence of Solid Lubricant Fillers on the Tribological Behaviour of PEEK Composites in Vacuum**
Gradt,T.; Theiler,G.
- P-11 **Micro-3 High Precision Low Disturbance Rotary Actuator**
Nalbandian, R.
- P-12 **Multi-Purpose Hold-down & Release Mechanism**
Konink,T.; Kester G.
- P-13 **Nanometric Resolution Absolute Position Encoders**
Masa,P.; Franzi, E.; Urban, C.
- P-14 **Nitinol 60 as a Material for Spacecraft Triboelements**
Pepper,S.V.; Dellacorte,C.; Noebe,R.D.; Hull,D.R.; Glennon,G.
- P-15 **Perpetuation of MAPLUB greases range**
Sicre,J.; Vergne,P.; Guillaumon, O.; Jugniot,P.
- P-16 **Brushless Slipping for High Power Transmission**
Santoro,C.; Hayes,R.; Herman,J.
- P-17 **SEPTA 41 Ev - A fully integrated solar array drive assembly**
Rabin,J.; Michaud, S.; Sicre,J.
- P-18 **Shape Memory Alloy Rotary Actuator for operation in Mars**
Collado,M.; Cabás,R.; Fernandez,D.; Moreno,L.; López,F.; Abderrahim,M.
- P-19 **Technological features in the new mole penetrator "KRET"**
Grygorczuk,J.; Seweryn,K.; Wawrzaszek,R.; Banaszkiwicz M.
- P-20 **@Bus Thruster Orientation Mechanism Delta Design**
Blanc,A.; Champandard, F; Lautier, J.M.; Michel,Y.

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