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Editorial

FOREWORD TO THE THEMATIC ISSUE: *TRIBOLOGY IN AEROSPACE APPLICATIONS – DAMPING, WEAR AND STRUCTURAL DYNAMICS IN AEROSPACE SYSTEMS*

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EDITORIAL

Dynamics and tribology are of high relevance for aerospace structures. As examples may be mentioned: 1) unfolding systems for antenna designs of spaceships: drives, gears, cylindrical and ball bearing, orientation systems; 2) development of systems for solar panels for spacecraft "Progress" and modules of the International Space Station. In these systems, structural dynamics and tribological problems are closely interrelated (Fig. 1). For the description and optimization of such systems theoretical and experimental investigations of the structural dynamics in the context of the mechanics of tribological interfaces taking into account the material behavior under high vacuum and partly even in extreme temperatures are required. These problems have been discussed during the German-Russian Workshop on "Tribology in aerospace applications: damping, wear and structural dynamics in aerospace systems", which was held at the Technische Universität Berlin October 6-8, 2014.

In the center of interest of the workshop were issues at the interfaces between structural dynamics, contact mechanics, material science, friction, wear, modeling and simulation. An important issue is the coupling of simulation methods of different scales. The main topics of the workshop included:

- Materials science aspects of tribology,
- Discrete element and molecular dynamics,
- Method of Dimensionality Reduction,
- Coupling simulation methods of different scales,
- Tribology at low temperatures,
- Polymer materials for friction systems in vacuum technology, and,
- System dynamics and tribology: needs of aerospace technologies.

After discussion of the presentations and the round table discussion concerning tribology in aerospace applications, the participants of the workshop came to the conclusion that the dynamic modelling of aerospace structures is a topic of high practical

and scientific interest. Of particular interest is structural damping in joints and inside the material. Effective simulation methods for frictional interfaces, such as the method of dimensionality reduction [1], should be combined with fast finite element simulation methods [2] of entire structures as well as material analysis via mesoscopic particle methods such as Method of Movable Cellular Automata (MCA), [3]. Other topics of interest are the degradation and internal friction in composite materials under spaceflight conditions, and testing of bio-inspired adhesive and other tribological materials under space conditions.

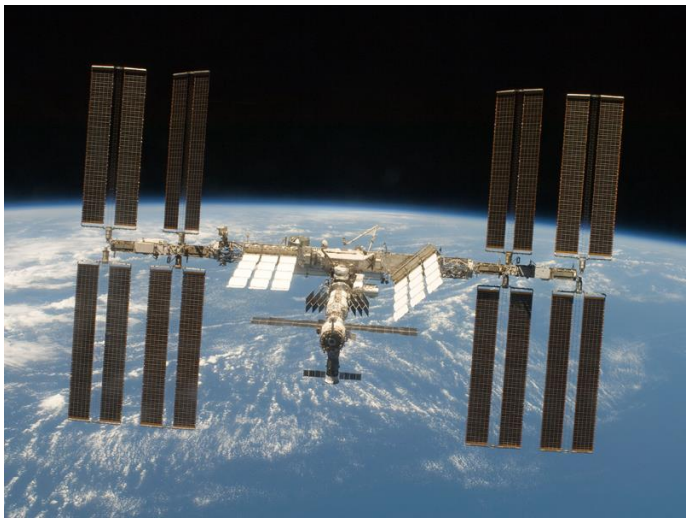

Fig. 1 International Space Station: the space structures contain thousands of tribological interfaces, © RKK Energia

The present thematic issue contains a collection of papers presented during the workshop with the main emphasis to adhesion, friction, interrelation of friction and vibrations and energy dissipation in systems with tribological contacts.

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