German-Russian Workshop

Tribology in aerospace applications: damping, wear and structural dynamics in aerospace systems

Technische Universität Berlin
October 6-10, 2014

Organizers

Prof. Dr. Valentin L. Popov and Prof. Dr. Sergey Psakhie and A. Chernyavsky

Location

The Workshop will take place at the TU Berlin

Building MS, room MS107
Einsteinufer 5,
D-10587 Berlin

(see attached campus plan of the Berlin Technical University).

Contact

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### October 06

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:20 – 8:50</td>
<td>Registration</td>
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<tr>
<td>8:50 – 9:00</td>
<td>Opening: Popov V.L.</td>
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| 9:00 – 9:40| Chair: A. Filippov  
Structural dynamics and damping  
M. Zehn & D. Marinkovic.  
Fast and highly efficient flexible body formalisms for structural dynamics simulations  
Berlin University of Technology, Germany |
| 9:40 - 10:10| M. Popov & V. Popov.  
Relaxation damping in oscillating contacts  
Berlin University of Technology, Germany |
| 10:10 - 10:45| V. Skripnyak  
Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia |
| 10:45 - 11:05| coffee break                                                      |
| 11:05 - 11:45| Chair: V.L. Popov  
Vacuum and cryogenic tribology  
T. Gradt  
Solid Lubricants for Cryogenic Engineering.  
BAM Federal Institute for Materials Research and testing, Berlin, Germany |
| 11:45 - 12:25| G. Theiler  
Tribology of polymers materials for vacuum applications  
BAM Federal Institute for Materials Research and testing, Berlin, Germany |
| 12:25 – 12:40| Photo in front of the institute of mechanics                           |
| 12:10 – 14:10| lunch                                                                  |
| 14:10 -14:45| Chair: E. Shilko  
Friction and wear in oscillating contacts  
A. Dimaki  
Theoretical study of fretting of contacting bodies of revolution in the framework of the method of dimensionality reduction  
Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia |
| 14:45 – 15:20| N. Milahin & J. Starcevic  
Influence of the normal force and contact geometry on the static force of friction of an oscillating sample  
Berlin University of Technology, Germany |
| 15:20 – 15:55| V. Popov, M. Popov, E. Teidelt  
Influence of normal oscillations on sliding friction  
Berlin University of Technology, Germany |
| 15:55 – 16:15| coffee break                                                      |
| 16:15 – 16:50| Chair: A. Dmitriev  
Adhesion  
A. Filippov  
Bio-inspired adhesive artificial structures suitable for aerospace applications  
Academy of Sciences of Ukraine |
October 07

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<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
<th>Institution</th>
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<tr>
<td>9:00 – 9:40</td>
<td>J. Luo</td>
<td>Advances in Liquid Superlubricity</td>
<td>State Key Laboratory of Tribology, Tsinghua University, Beijing, China</td>
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<tr>
<td>9:40 – 10:20</td>
<td>Q. Li</td>
<td>Friction between an elastomer and a rigid rough surface</td>
<td>Berlin University of Technology, Germany</td>
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<tr>
<td>10:20 -10:50</td>
<td>R. Heise</td>
<td>Temperature shift in elastomer contacts</td>
<td>Berlin University of Technology, Germany</td>
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<tr>
<td>10:50 – 11:10</td>
<td></td>
<td>coffee break</td>
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<tr>
<td>11:10 – 11:45</td>
<td>E. Kolubaev</td>
<td>Some features of microstructure generation in friction stir welding</td>
<td>Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia</td>
</tr>
<tr>
<td>11:45 – 12:20</td>
<td>A. Dmitriev</td>
<td>MD study of microstructure evolution under conditions similar to friction stir welding</td>
<td>Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia</td>
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<tr>
<td>12:20 – 12:50</td>
<td>R. Balokhonov</td>
<td>A numerical simulation of the microstructure effect in deformation and fracture of friction stir welded aluminum alloys used in aerospace systems</td>
<td>Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia</td>
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<tr>
<td>12:50 – 14:20</td>
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<td>lunch</td>
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<td>14:20 - 15:00</td>
<td>E. Shilko, S. Psakhie, V. Popov</td>
<td>The key role of elastic vortices in unsteady propagation of longitudinal shear cracks</td>
<td>Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia</td>
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<td>15:00 - 15:35</td>
<td>A. Smolin</td>
<td>Computer-aided study of identification of nanosized defects in surface layers based on friction measurement</td>
<td>Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia</td>
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<td>15:35 – 16:10</td>
<td>V. Romanova</td>
<td>Mechanical aspects of strain-induced surface roughening in aluminium alloys</td>
<td>Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia</td>
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<td>16:10 – 16:30</td>
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<td>coffee break</td>
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<tr>
<td>Time</td>
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| 16:30 – 17:05| Chair: V. Romanova  
*Stress and failure analysis*  
N. Zhou  
The failure analysis of a flywheel with abnormal running characteristics  
Space Bearing Applications Laboratory, Beijing Institute of Control Engineering, Beijing, China |
| 17:05 – 16:40| I. Smolin  
Dynamic stress analysis of the metallic superficial layer in sliding contact with friction  
Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia |
| 18:00        | Conference diner                                                         |
| **October 08**|                                                                                   |
| 9:00 - 9:35  | Chair: V. Popov  
*Friction: Experiment, theory, numerical simulation*  
Y. Lyashenko  
Thermodynamic representation of boundary friction mode  
Sumy State University, Ukraine, |
| 9:35 – 10:10 | Deng & Luo  
Superlubricity Investigation of Mixtures of Acid and Polyhydric Alcohol in Running-in Processes  
State Key Laboratory of Tribology, Tsinghua University, Beijing, China |
| 10:10 -10:45| Astafurov S.  
Development of multiscale numerical models of materials with multimodal internal structure in the framework of discrete element method  
Institute of Strength Physics and Material Science, Russian Academy of Sciences Tomsk, Russia |
| 10:45 – 11:05| coffee break                                                             |
| 11:05 – 12:30| Round table:  
Tribology in aerospace applications: damping, wear and structural dynamics in aerospace systems |
| 12:30 – 12:40| Closing                                                                   |
The Way to the Institute of Mechanics

By Air

- International Airport Berlin-Tegel
  - By taxi (approx. 15 min.);
  - By Airport-Express-Bus Transfer-Line X9 (approx. 25 min.) or by City-bus Line 109 (approx. 45 min.) to the stop "Zoologischer Garten" and then as described from train station "Berlin-Zoo" to the IfM.

- International Airport Berlin-Schönefeld
  - By taxi (approx. 45 min.);
  - By AirportExpress-Train (approx. 35 min.) or RegionalExpress-Train (approx. 40 min.) to the stop "Zoologischer Garten" and then as described from train station "Berlin-Zoo" to the IfM.
  - By S-Bahn Line S9 (approx. 60 min.) to the stop "Zoologischer Garten" and then as described from train station "Berlin-Zoo" to the IfM.

- International Airport Berlin-Tempelhof
  - By taxi (approx. 30 min.);
  - By Underground Line U6 and Line U2 (approx. 45 min.) to the stop "Zoologischer Garten" and then as described from train station "Berlin-Zoo" to the IfM.

By Train

- Train Station "Berlin-Zoo"
  - By taxi (approx. 10 min.);
  - On foot (approx. 10 min.) via Lebensstraße, Hertzallee, crossing the Fasanenstrasse and entering the campus, then turn right to the building "Gebäude M".

By Car

- From the direction of Hannover, Leipzig, Nürnberg:
  - take the motorway A115 (Avus) to Charlottenburg A100, exit "Spandauer Damm", turn right into and follow "Otto-Suhr-Allee" until you reach the circle "Ernst-Reuther Platz", take the third exit "Straße des 17. Juni", keep straight right to enter the campus.

- From Northern Europe, direction Hamburg, Rostock:
  - take the motorway A111 to Charlottenburg A100, exit "Spandauer Damm", turn left into and follow "Otto-Suhr-Allee" until you reach the circle "Ernst-Reuther Platz", take the third exit "Straße des 17. Juni", keep straight right to enter the campus.