

Chinese-German Workshop
Advances in Tribology

Tsinghua University, Beijing, China

September 5 - 8, 2005

In the last decade, the physics of friction has become one of the key disciplines contributing to the most rapidly developing branches of technology as micro-mechanical systems, nanotechnologies as well as materials science. The "traditional" branches of tribology, lubrication and wear, have also undergone striking changes. The appearance of new experimental possibilities of studying friction at the atomic level as well as progress in computational techniques lead to a rapid progress in understanding of fundamental friction processes and to new technological developments. At the same time, the study of atomic mechanisms of friction has shown that the investigation of friction at the micro scale only is not sufficient to adequately describe tribological systems. A systematic research of friction processes at one or several mesoscopical scales as a binding element between micro and macro scales is necessary. The friction physics is now in a kind of "threshold" situation, where a synthesis of research results at different scales is in demand. The purpose of the workshop is to bring together specialists from different areas of research (physics, tribology, materials science, engineering, numerical simulation methods) and industry in order to discuss the topical achievements of tribology of the last decade and to formulate a theoretical and experimental program for future investigations.

Topics

- Atomic mechanisms of friction
- Interrelation of friction and material parameters
- Experimental methods: from macro- to nanoscale
- Interrelation of scales, hierarchical models
- Wear and development of surface topography
- Technological applications

Call for papers

If you are interested in the participation, please submit an abstract in English not later than April 3, 2005 to one of the addresses below (preferably by e-mail).

Organisation & contact

In China:

Prof. Luo Jianbin
State Key Lab. of Tribology
Building 9003
Tsinghua University
Beijing 100084
CHINA

Tel: +86 (0)10 62781385/0
Fax: +86 (0)10 62781379
E-mail: luojb@tsinghua.edu.cn

In Germany:

Prof. Dr. Valentin Popov
TU Berlin
Institute of Mechanics
Skr. C8-4
Str. des 17. Juni 135
D-10623 Berlin
GERMANY

Tel: +49 (30) 314 21 480
Fax.: +49 (30) 314 72 575
E-mail: v.popov@tu-berlin.de



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D-10623 Berlin
GERMANY

Tel: +49 (30) 314 21 480
Fax.: +49 (30) 314 72 575
E-mail: v.popov@tu-berlin.de

Local Organization: Prof. Wang H., Prof. Guo D. and Ms. Qi Y.H.

Program

5th September

10:00-18:00	Registration (In the lobby of the hotel)
16:00-18:00	Visiting the State Key Laboratory of Tribology, Tsinghua University
18:30	Welcome party (Prof. Meng YG and Prof. Shao TM)

6th September

8:30-8:50 **Opening Remarks** (Chairman: **Prof. Luo Jianbin**)

Session I (Chairman: **Prof. Wen Shizhu**)

8:50-9:20 Three Axioms and Modelling in Tribology**
(**Yubai Xie**, Xi'an Jiao Tong University, China)

9:20-9:50 A Dynamic Friction Law*
(**Georg-Peter Wilhelm Ostermeyer**, Institute of Dynamics and
Vibrations, Technical University of Braunschweig, Germany)

9:50-10:20 <**Break and take picture**>

Session II (Chairman: **Prof. Popov**)

10:20-10:50 Nano tribology**
(**Qunji Xue**, Lanzhou Institute of Chemical Physics, Chinese academy
of Sciences, China)

10:50-11:20 Friction Reduction in Mixed Lubrication*
(**Dong Zhu**, Eaton Corporation, Innovation center, 26201 North-
western Highway, Southfield, USA)

11:20-11:50 Physical Mechanics of Nano Tribology*
(**Wanlin Guo**, Institute of Nano Science, Nanjing University of
Aeronautics and Astronautics, China)

12:00 **Lunch time** (In Jin Chun Yuan Hotel)

Session III (Chairman: **Prof. Xue Qunji**)

14:10-14:40 Tribology and noise generation in disc brakes**
(**Jörg Wallaschek**, University Paderborn Heinz Nixdorf Institute
Mechatronics and Dynamics, Germany)

14:40-15:10 Study on Mechanism of Cavitation Erosion*
(**Darong Chen and Jiadong Wang**, SKLT, Tsinghua University, China)

15:10-15:40 New tools are filling the gap in industrial micro-tribology*
(**Olaf Mollenhauer**, Tetra GmbH, Germany)

15:40-16:00 **Break**

Session IV (Chairman: **Prof. Hu Yuanzhong**)

- 16:00-16:30** Preparation and properties of new lubrication additives*
(**Weimin Liu**, Lanzhou Institute of Chemical Physics, Chinese academy of Sciences, China)
- 16:30-17:00** New results in the simulative description of the dynamical processes in the contact area of a brake system on different time scales*
(**Michael Müller**, Institute of Dynamics and Vibrations, Technical University of Braunschweig, Germany)
- 17:00-17:30** Surface Texturing by Laser Induced Modification*
(**Tanmin Shao**, SKLT, Tsinghua University, China)
- 17:30-18:00** Preparation and tribological properties of molecular films*
(**Miao Chen**, Lanzhou Institute of Chemical Physics, Chinese academy of Sciences, China)
- 18:15** **Dinner** (In Jin Chun Yuan Hotel)

7th September

Session I (Chairman: **Prof. Zhang Siwei**)

- 8:30-9:00** Numerical Simulation Methods in Tribology**
(**Valentin Popov**, Institute of Mechanics, Technical University of Berlin, Germany)
- 9:00-9:30** DLC Coating and PFPE Lubrication on Hard Driver Disks-Molecular Dynamics Simulations*
(**Yuanzhong Hu**, SKLT, Tsinghua University, China)
- 9:30-10:00** Theoretical Foundations of Tribospectroscopy*
(**Gero Putzar**, Institute of Mechanics, Technical University of Berlin, Germany)
- 10:00-10:20** **Break**

Session II (Chairman: **Prof. Jörg Wallaschek**)

- 10:20-10:50** Movements and Collisions of Nanoparticles**
(Jianbin Luo and Wen Shizhu, SKLT, Tsinghua University, China)
- 10:50-11:20** Numerical simulation of the process of mechano-chemical polishing*
(**Uwe Herbrich**, Institute of Mechanics, Technical University of Berlin, Germany)
- 11:20-11:50** Process Tribology in Polishing of Computer Hard Drive Disk Substrate*
(**Bill Lee**, R&D Director, Kaifa Magnetic Recording Co. Ltd., ShenZhen, China)
- 12:00** **Lunch time** (In Jin Chun Yuan Hotel)

Session III (Chairman: **Prof. Zhang Jun**)

- 14:10-14:40** Possibilities of prevention of strong earthquakes: simulations and a laboratory model
(**Valentin Popov**, Institute of Mechanics, Technical University of Berlin, Germany)
- 14:40-15:10** Analyses on the thermal elastohydrodynamic lubrication of tapered rollers*
(**Peiran Yang**, Qingdao Institute of Architecture and Engineering, China)
- 15:10-15:40** Reduced description of mixed lubrication*
(**Thomas Geike**, Institute of Mechanics, Technical University of Berlin, Germany)

15:40-16:00 **Break**

Session IV (Chairman: **Dr. Martin Schargott**)

- 16:00-16:30** Static and Dynamic Friction of Sidewalls in Bulk-fabricated MEMS*
(**Yonggang Meng**, SKLT, Tsinghua University, China)
- 16:30-17:00** Tribospectroscopical investigation of friction and wear mechanisms in metals and polymers*
(**Jasminka Starcevic**, Institute of Mechanics, Technical University of Berlin, Germany)
- 17:00-17:30** A Novel Lubricant Film for Heat Assisted Magnetic Recording (Hamr) Media*
(**Jun Zhang** et al., Data Storage Institute, SG117608, Singapore)
- 17:30-18:00** PZT multilayers actuator for precision localization of magnetic head*
(**Xinchun Lu**, SKLT, Tsinghua University, China)

(18:30-21:30) **Banquet** (**Prof. Shao TM and Prof. Meng YG**)

8th September

Session I (Chairman: **Prof. Matthias Scherge**)

- 8:30-9:00** Adhesion in biological systems*
(**Martin Schargott**, Institute of Mechanics, Technical University of Berlin, Germany)
- 9:00-9:30** The fractal characterization of wear particles of UHMWPE hip joint*
(**Shirong Ge**, China University of Mining and Technology, China)
- 9:30-10:00** Geometry of elytra opening and closing in some beetles and its Mechanics*
(**Zhendong Dai**, University of Aeronautics and Astronautics, China)

10:00-10:20 **Break**

Session II (Chairman: **Prof. Liu Weimin**)

- 10:20-10:50** Measuring hydrodynamic effects in ultra thin liquid films**
(**Roger Horn**, Ian Wark Research Institute, University of South Australia, South Australia 5095, Australia)
- 10:50-11:20** Bionspired adhesives based on the biomechanics of insect adhesion**
(**Stanislav Gorb**, Evolutionary Biomaterials Group, Max-Planck-Institute for Metal Research, Germany)
- 11:20-11:50** Challenges on Tribology Research From Hostile Environment and Extreme Conditions
(**Liqin WANG**, School of Mechatronics Engineering, Harbin Institute of Technology, Harbin 150001, China)
- 12:00** **Lunch time** (In Jin Chun Yuan Hotel)

Session III (Chairman: **Prof. Georg-Peter Wilhelm Ostermeyer**)

- 14:10-14:40** Wear mechanisms at the nanoscale*
(**Matthias Scherge**, IAVF Antriebstechnik AG, Germany)
- 14:40-15:10** Effects of Friction Heat on Tribological Properties of UHMWPE*
(**Jian Li**, Wuhan Research Institute of Materials Protection, China)
- 15:10-15:40** Contacts mechanics of fractal surfaces: Hierarchical modeling*
(**Markus Heß**, Institute of Mechanics, Technical University of Berlin, Germany)
- 15:40-16:00** **Break**

Session IV (Chairman: **Prof. Ge Shirong**)

- 16:00-16:30** Contact stress analysis between roller and raceway*
(**Jiwei Luo**, Luoyang Bearing Research Institute, China)
- 16:30-17:00** Study of the Relationship between Wear Particles and Wear Components in Wear Process
(**Xinping Yan**, Wuhan University of Science and Technology, Wuhan, Hubei Province)
- 17:00-17:30** Tribological characteristics of materials under high-speed sliding*
(**Yongzhen Zhang**, Henan University of Science and Technology, China)
- 17:00-18:00** **Discussion**
- 18:15** **Dinner** (In Jin Chun Yuan Hotel)

Note: ** Keynote speech
* Invited speech

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Tsinghua Campus Guide Map

