STEVENS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

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Carnegie Bldg. Room 315, Time 1:30 pm

Hierarchical Mechanisms Of Friction :Why Friction And Mechanical Properties Are Different At The Time Nanoscale

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Nanodevices and other small-scale applications have large surface-to-volume ratios. Therefore, it is important to understand surface phenomena such as he friction and adhesion at the nanoscale. Since the advent of the atomic force microscopy (AFM), it is possible to measure very small forces. The experimental data show that the nanoscale coefficient of friction is different from that at the macroscale, and this scale effect should be explained. In the seminar, various mechanisms of dry friction as hierarchical (multiscale) phenomena will be discussed. A small parameter, which physically corresponds to the interface-to-bulk ratio of forces, is present in these mechanisms, leading to the almost universally-observed linear Coulomb's law. The multiscale surface roughness, which corresponds to multiscale dissipation mechanisms, can yield surfaces with desirable frictional properties (i.e. either low or high friction and adhesion). Many of these multiscale (hierarchical) surfaces for low or high friction/adhesion are found in biological objects. Examples include the gecko lizard foot, lotus leaf, insect legs, butterfly wings, etc.

Dr. Nosonovsky obtained B.S. and MS degrees in Mechanical Engineering (ME) from St. Petersburg Technical University in St. Petersburg (Russia) and a Ph.D. degree in ME from Northeastern University in Boston (MA). Prior to his current research position at the National Institute of Standards and Technology (NIST) he was a Postdoctoral Scholar at The Ohio State University. His research interests include the multi-scale modeling in contact mechanics, nana/biomechanics as well as vibrations and wave propagation. He has received several awards for his outstanding achievements in research, teaching and professional activities.

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