

Spring 2015 MAE 6950

Special Topics in Mechanical and Aerospace Engineering

Modeling and Design of Micro- and Nanoelectromechanical Systems

Instructor: Slava Krylov
Mary Upson Visiting Professor

Tuesday, Thursday 1:25-2:40
February 10 – March 24
2 credit hours

In light of increasing complexity and diversity of micro and nano structures serving as components of micro and nanoelectromechanical systems, modeling issues have become of primary importance. Increasing performance requirements have resulted in the emergence of sophisticated designs that exploit ever more complex physical phenomena.

The course will focus on selected aspects of modeling of microdevices, structural behavior and actuation principles. Attention will be paid to the understanding of generic nonlinearities, which are intrinsic in microstructures and not often encountered in large-scale structures. Specifically, the course will cover mechanics of geometrically nonlinear elastic suspensions, formulation and analysis of coupled problems with applications to electrostatically and thermally actuated devices, bistable and multistable actuators, static and dynamic stability criteria and parametric excitation of micro structures. Design implications related to the physical phenomena and implementation of the modeling techniques for the evaluation of design parameters will be discussed.