

For more information: 202-994-6749
Hosts: Professors David Chichka (Chichka@gwu.edu) & James Lee (jdlee@gwu.edu)

MAE SEMINAR SERIES

Size-dependent Mechanics and Applications to Quantum Dots, Nanoscale Piezoelectricity and Defects

PRADEEP SHARMA
Department of Mechanical Engineering
University of Houston
Houston, TX

Monday, December 4, 2006, 11AM
Phillips Hall 7th Floor Conference Room #736

Classical mechanics is intrinsically size-independent and as such does not distinguish between structures that are self-similarly scaled from miles to nanometers. In this presentation, we discuss the various physical causes that may render the elastic state size-dependent. In particular we discuss, in some detail, the role of surface energies, nonlocal interactions and quantum confinement. We also briefly touch upon the oft-debated question on the (ir)-relevancy of nonlocal elasticity for nanotechnologies. Several applications of the present work are illustrated: (1) scaling of strain-band structure coupling in quantum dots and comparison with insights from quantum mechanical calculations, (2) possibility of creating “apparently piezoelectric” nano-composites without piezoelectric constituents and (3) defect interactions in graphene and comparison with molecular dynamics.

Bio-sketch:

Pradeep Sharma is the Bill D. Cook Chair Assistant Professor in the department of mechanical engineering at the University of Houston. He also has a joint appointment in the department of physics. He received his Ph.D. in mechanical engineering from University of Maryland at College Park in the year 2000. Subsequent to his doctoral degree, he was employed at General Electric R & D for more than three years as a research scientist. There he worked in two simultaneous programs on Nanotechnology and Photonics apart from basic research in problems of mechanics of materials. He joined University of Houston in 2004. His honors and awards include the Young Investigators Award from Office of Naval Research, Texas Space Grants Consortium New Investigators Program Award and the University of Houston Excellence in Research Award. He is the associate editor of the “Journal of Computational and Theoretical Nanoscience”.