

MECHANICAL AND AEROSPACE ENGINEERING COLLOQUIUM SERIES

“A Cosserat rod model for carbon nanotubes”

Professor Subrata Mukherjee
Cornell University

Friday, September 11, 2009

1:30PM

205 Thurston Hall

Refreshments: 2:30pm, 206 Thurston Hall

ABSTRACT

This talk presents a Cosserat rod model for mechanical deformations of a single-walled carbon nanotube (SWCNT). The proposed model takes into account : bending, twist, shear and extension of the SWCNT. Exploitation of certain symmetries in the underlying atomic structure of the SWCNT leads to a suitable representation of its continuum elastic strain energy density in terms of appropriate strain measures. Bridging between the atomic scale and the continuum model is carried out by parameterization of the continuum elastic energy and determination of these parameters from unit cell atomistic simulations over a range of deformation magnitudes and types. This model includes both anisotropy and large strains. Finite element method simulations of mechanical deformations of SWCNTs, based on the strain energy density model presented in this talk, are currently ongoing.