2010-2011

Graduate Seminar Series

The Department of Mechanical Engineering – Engineering Mechanics

Proudly Presents

Dr. Harold S. Park
Boston University

Harold S. Park is currently assistant professor of Mechanical Engineering at Boston University. Since receiving his Ph.D. in Mechanical Engineering from Northwestern University in 2004, his research has focused on developing and utilizing both atomistic and multiscale modeling approaches to understand surface effects on the behavior and properties of low-dimensional nanostructures such as nanowires and graphene. He is the recipient of a 2007 NSF CAREER award, a 2008 DARPA Young Faculty Award, and the 2009 Gallagher Young Investigator Award from the US Association for Computational Mechanics; further information about Prof. Park's research can be found online at: http://www.researcherid.com/rid/B-1525-2008

Thursday, Oct. 7, 2010 4:00 – 5:00 p.m. Room 112, ME-EM Bldg.

Atomistic and Multiscale Modeling of Surface Effects on the Mechanical Behavior and Properties of Nanomaterials

Surface dominated nanostructures such as nanowires have recently garnered significant attention due to their unique physical properties. In this presentation, I will discuss recent efforts using various computational modeling techniques to gain further insights into unique mechanical behavior and properties that result from these surface effects.

Using atomistic modeling, I will discuss recent predictions of novel shape memory and pseudoelastic behavior observed in FCC and intermetallic nanowires that are not observed in the corresponding bulk materials. I will discuss the important role of nanoscale surface stress effects in enabling the shape memory response, and I will discuss the novel atomistic deformation mechanisms that are observed during the mechanical deformation of shape memory nanowires.

The second part of the talk will discuss recent developments in multiscale, finite element method-based modeling to capture surface effects on the mechanical behavior and properties of both FCC metal and semiconducting nanowires. I will discuss this approach, the surface Cauchy-Born model, then demonstrate its ability to capture size, surface and boundary condition effects on the elastic properties of the nanowires. Specific attention will be made to compare the obtained results to those where surface effects are neglected such that an understanding of how surface effects impact the elastic properties of nanowires across various length scales can be obtained.

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