DEPARTMENT OF CIVIL, STRUCTURAL AND ENVIRONMENTAL ENGINEERING

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MCEER EARTHQUAKE ENGINEERING TO EXTREME EVENTS

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ENGINEERING SEMINAR

Size-Dependent Continuum Mechanics

Abstract

Classical continuum mechanics provides a reasonable basis for analyzing the behavior of materials at the macro scale. However, experiments show that the mechanical behavior of materials in small scales is different from their behavior at macro scales. Consequently, there is need for a more complete continuum mechanics, which spans many scales and, of course, must reduce to classical continuum mechanics for bodies with macro-scale size. It has been suggested that new size-dependent measures of deformation, such as the curvature tensor, are required in a complete continuum theory, which must also involve couple stresses in matter. This theory, whose origin goes back to the Cosserat brothers (1909), has had many inconsistencies from the very beginning. This has caused development of a number of different theories, such as couple stress theory and micro-polar theory, each with its own difficulties. Recently, we have been able to resolve systematically the troubles and to discover the main character of couple stresses in continuum mechanics by introducing consistent measures of deformation. In this presentation, consistent theories for elastic bodies and viscous fluids will be presented, along with numerical results based on boundary element and finite element methods.

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Dr. Alireza Hadjesfandiari is a Research Scholar in the Department of Mechanical and Aerospace Engineering of State University of New York at Buffalo. He received his Ph.D. degree in computational mechanics from the University at Buffalo. His main research focuses on theoretical and computational mechanics in the area of strength analysis and fracture mechanics. He is also involved in some fundamental research in theoretical physics.

Date: Friday, February 22, 2013 **Time:** 11:00 AM – 12:30 PM

Location: 140 Ketter Hall, North Campus, University at Buffalo

Webcast: http://civil.eng.buffalo.edu/webcast

Technical Questions: seeslwebcast@gmail.com

Refreshments will be served!

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