SEMINAR

Department of Materials Science and Engineering
and
Center for Advanced Materials and Nanotechnology
Lehigh University

A computational approach to materials-by-design

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Refreshments served at 3:45 P.M. in Student Lounge

Abstract

We will discuss recent advances in the development of computational algorithms for the design of multi-stage deformation processes that lead to products of desired properties. Multi-stage forming process design examples will be presented to demonstrate the use of design simulators in an accelerating materials insertion.

A number of fundamental multi-length scale deformation process design problems will also be introduced. The use of reduced-order models to model the evolution of the microstructure will be emphasized. We aim to point to techniques that may be important in controlling microstructure-sensitive properties leading to a materials-by-design approach.

Biography

After completing doctoral work in Theoretical and Applied Mechanics, Professor Zabaras joined the faculty of the Mechanical Engineering Department at the University of Minnesota, Minneapolis, MN. He became a Cornell faculty member in 1991. Zabaras is a member of the American Society of Mechanical Engineers, the American Academy of Mechanics and of the Society for Industrial and Applied Mathematics. He received a Presidential Young Investigator Award from the National Science Foundation in 1991.

His main research focus is on the computational design and control of materials processes including deformation and solidification/crystal growth processes. Specific current projects include the development of robust design simulators for deformation and solidification processes, spectral stochastic methods for modeling of uncertainty propagation in analysis, optimization and design of continuum systems, and development of multi-length scale algorithms for the analysis and design of microstructures in engineering materials. He is also very active in interfacing robust control of continuum systems with information technologies including machine learning techniques in order to develop real time feedback mechanisms for the control of complex materials processes in the presence of uncertainty.

Professor N. Zabaras is the director of the Materials Process Design and Control Laboratory and detailed information on current research interests and list of publications and other activities can be found at the MPDCL web site.

Attendance is required of all full-time MS&E Graduate Students
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