

Announcement

Earn a PhD in Engineering with Full Research Assistantship

at

Center for Advanced Vehicular Systems
Bagley College of Engineering
Mississippi State University
Starkville, Mississippi, USA

Research Areas: Computational Structural Mechanics and Design Optimization

Starting Date: January 1, 2009

Research Project Sponsor: National Science Foundation (Engineering Design and Innovation Program)

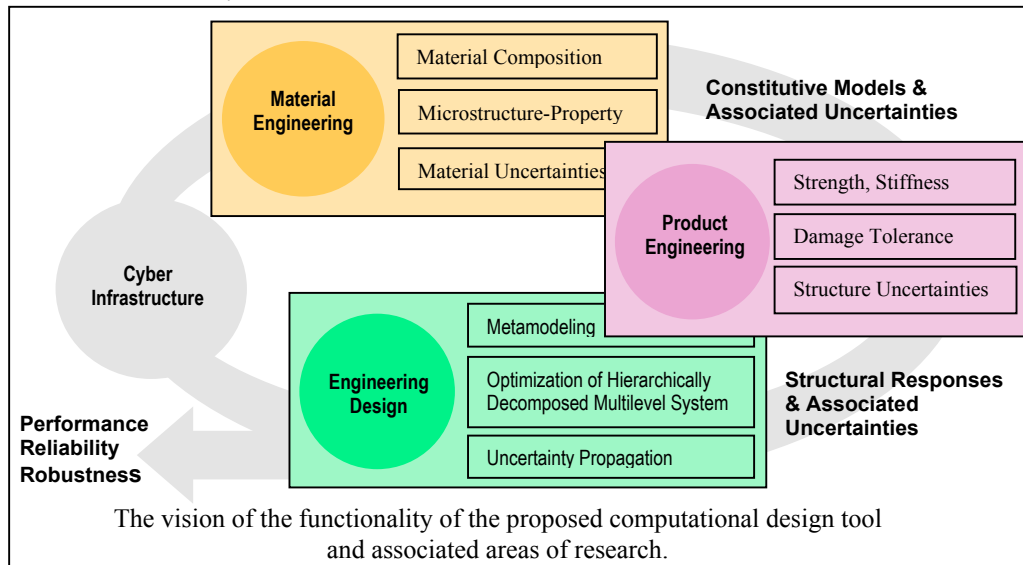
Principal Investigator (contact person): Prof. Masoud Rais-Rohani (Masoud@ae.msstate.edu)

Co-Principal Investigators: Prof. D. Bammann, Dr. E. Marin, and Dr. T. Haupt

Synopsis

Performance, reliability, and robustness of a structural system are directly influenced by the mechanical properties of the material, which—in turn—are closely linked to its composition, microstructure, and loading history. Research efforts in hierarchical modeling of microstructure-property relations and the evolution of material properties are resulting in more sophisticated multiscale material models with the ability to bridge both the spatial and temporal scales.

The goal of this project is to extend the range of product design domain deep into the material microstructure to optimize integrated product-material systems for better performance, improved quality, greater reliability, and lower cost. The principal objective is to develop a *computational design tool for multilevel optimization of product-material systems under uncertainty*.



This project will involve research on novel computational methods for modeling of microstructure-property relations, multiscale based constitutive models, finite-element modeling and simulation of nonlinear structural responses, modeling of material and structure uncertainties, and optimization of hierarchically decomposed probabilistic multilevel systems. Cyberinfrastructure will integrate the components into a comprehensive tool, effectively forming a virtual organization for a multidisciplinary research. The effectiveness of the computational design tool will be evaluated by examining a number of benchmark problems.

The two research tracks are as follows:

1) **Microstructure-property relations, uncertainty analysis, and finite-element simulation**

2) **Probabilistic design, multilevel decomposition & optimization, metamodeling, and cyberinfrastructure**

The team of researchers working on this project includes experts in the areas of structural design optimization, solid mechanics, computational structural mechanics, and computer science.