The Department of Mechanical Engineering
College of Engineering and Applied Sciences
Stony Brook University

Mechanical Engineering Seminar

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Lecture Title: Research Opportunities at the Cross-Roads of Design, Manufacturing and High-Performance Computing

Thursday, October 20, 2016 at 1:30 PM, Room 173 Light Engineering Building

Abstract

This talk addresses some of the research challenges and opportunities that lie at the cross-roads of design, manufacturing and high-performance computing.

In the first part of this talk, an overview of design optimization methods will be presented. Following this, a level-set based topology optimization method, namely *Pareto*, will be introduced. *Pareto* relies on the concept of *topological sensitivity*, and can efficiently solve a variety of multi-physics, multi-constrained design problems.

In the second part, current efforts on integrating topology optimization and additive manufacturing will be summarized; topics include support structure minimization, microstructural and multi-material optimization.

Finally, the role of high-performance computing in design and manufacturing will be explored. A novel physics based *assembly-free deflated FEA* will be introduced, and its impact on large-scale simulation will be presented. Comparisons will be made against commercial implementations. The talk will conclude with open research challenges.

Biography

Dr. Krishnan Suresh is currently a Professor of Mechanical Engineering at the University of Wisconsin-Madison. He received a Master's in Manufacturing Engineering from UCLA in 1992, and a Ph.D. in Mechanical Engineering from Cornell in 1998. He later served as an Engineering Manager at Kulicke and Soffa Industries, Philadelphia from 1998 to 2002.

He has received numerous peer-reviewed grants, including the prestigious NSF Career award in 2007. His research interests include topology optimization, additive manufacturing, advanced finite element analysis and high-performance computing. He has co-authored several journal papers, and conference papers, two of which have received best-paper awards from ASME.