The Department of Mechanical Engineering/College of Engineering and Applied Sciences

Stony Brook University

Mechanical Engineering Seminar

Dr. Shikui Chen, Software Engineer
Department of Finite Element Solvers and Optimization Technology
Altair Engineering INC, Irvine, California

Lecture Title: Structural Shape & Topology Optimization: A Level Set Approach

Friday, February 8, 2013 at 2PM, Room 173 Light Engineering Building

Abstract

Topology optimization is a new technology which is capable of generating an optimal design without depending on the designers' intuition, experience and inspiration. It plays a crucial and rapidly expanding role in product design innovation, especially in automotive, aerospace and machine industries, where competitive products need to be efficiently achieved in order to meet the growing and challenging demands of the ever changing market. In this talk, the speaker will first briefly review the state of art of topology optimization, examine the limitations of existing approaches and then introduce a level-set based topology optimization framework. The intrinsic advantage of level set method over the traditional homogenization or SIMP based topology optimization approaches is that the boundary of the design is always clearly defined while topological changes such as boundary merging and splitting can be naturally handled. After that, the speaker will report some recent advances in level-set based topology optimization, which cover distributed compliant mechanisms synthesis, multi-physics and multi-material energy harvester design and a newly proposed concept of robust shape and topology optimization (RSTO) under uncertainty.

Biography

Dr. Shikui Chen is currently a software engineer in the department of finite element solvers and optimization technology at Altair Engineering INC, Irvine, California. He received his Ph.D. in mechanical engineering from Northwestern University (USA) in 2010, Ph.D. in computer-aided engineering from the Chinese University of Hong Kong in 2006, M.Eng. degree from Huazhong University of Science & Technology (HUST) in 2003 and B.S. degree from Hankou Branch of HUST in 2000. Dr. Chen's research interests are in the area of predictive science based design optimization, particularly in the fields of structural shape and topology optimization, geometric modeling with level set methods, PDE-constrained optimization, and simulation-based design under uncertainty. Dr. Chen is a member of ASME and AIAA. He was the recipient of the ASME Compliant Mechanisms Theory Award in the ASME 31st Mechanisms and Robotics Conference in 2007.