

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

Mechanical Engineering Seminar



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Lecture Title: Compliant Mechanism Synthesis and Virtual Reality Simulation

Friday, October 8, 2010, 11AM, Room 173 Light Engineering

Abstract

Compliant mechanisms gain at least some mobility from the deflection of flexible members rather than from movable joints only. These mechanisms are the skeleton of numerous machine systems ranging from precision instruments, smart structures, and medical devices to bio-nano machines. However the analysis and design of compliant mechanisms remains a significant challenge due to the interaction of two knowledge bodies: kinematics and continuum mechanics. In this talk, we will present a theoretical framework that incorporates new parametric models, high performance polynomial homotopy solvers and a screw theory based approach for kinetostatic (kinematics and static) synthesis of compliant mechanisms. This synthesis framework enables the function-to-form transformation that stimulates innovation in the early design stages. Several compliant mechanism applications including flexure based ultra-precision positioning devices, morphing wing structures and flapping wing structures, coronary stents will be presented. Virtual reality (VR) mimics the real world by using various sensory devices such as stereo glasses, position trackers and haptic (force feedback) devices and creates an environment that immerses the user in a computer generated world. VR has been proven to be a valuable tool for many fields ranging from product design to nanotechnology. This talk presents several VR applications including mechanical assembly simulation, design environment for protein based bio-nano machines and a recently developed Virtual Reality Mechanism Design Studio (VRMDS).

Biography

Dr. Haijun Su is an Assistant Professor in Mechanical Engineering Department at University of Maryland, Baltimore County (UMBC). Prior to joining UMBC in August 2007, he was a Postdoctoral Associate at Virtual Reality Application Center (VRAC) of Iowa State University. Dr. Su received his B.S. (1995) and M.S. (1998) from Beijing University of Posts and Telecommunications, and Ph.D. (2004) from the University of California, Irvine, all in Mechanical Engineering. Awards received by Dr. Su include the MSC Software Simulation award in 2002, the finalists of Mechanism and Robotics best paper award in 2005, the NSF Faculty Early Career Development (CAREER) award in 2008, the Compliant Mechanism Theory best paper award in 2009, Air Force Summer Faculty Fellowship and ASME M&R Freudenstein/GM Young Investigator award in 2010. Dr. Su served as a symposium co-chair for the ASME IDETC/CIE conferences in 2008, 2009, 2010 and the Industry Relation Chair of the 2010 ASME IDETC/CIE. He is currently a member of Sigma Xi, ASME, IEEE, ASEE, AMS.

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