

WILLIAM MAXWELL REED

MECHANICAL ENGINEERING SEMINAR

INVERSE DESIGN AND CONTROL OF THERMAL SYSTEMS WITH SIGNIFICANT RADIATIVE TRANSFER

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Abstract: Design of a thermal system begins with specification of a desired outcome (outlet steam temperature and pressure from a steam generator, temperature profile and feed rate of material to be annealed, temperature and heat flux required on a workpiece, etc.). Using trial-and-error, a heating system can be designed to meet these specifications, and the performance is then predicted using a numerical model of the system or experiment. If the performance does not meet the specifications, the design is altered, and the performance is rechecked.

Inverse design seeks to improve the design process by using methods that provide a very good or near-optimal design through solution of the ill-posed math models that result in design problems of this kind. The progress in thermal design of systems with multi-mode heat transfer will be reviewed along with recent work on applying inverse solutions to the control of distributed radiative energy sources.

Bio: Professor Jack Howell presently holds the Earnest Cockrell, Jr. Chair at the University of Texas-Austin, where he directs the Advanced Manufacturing Center. Previously he was a heat transfer researcher at the NASA Lewis (now Glenn) Research Center and taught at the University of Houston. In 1994/5, he served as Program Director, Thermal Transport and Thermal Processing Program with the National Science Foundation. He has received a number of awards for his work in radiative transfer, including the ASME Heat Transfer Memorial Award, the AIAA Thermophysics Award, and the Max Jakob Award. He is a Life Fellow of ASME and a Fellow of AIAA, and was elected a Foreign Member of the Russian Academy of Science in 1999 and became a member of the US National Academy of Engineering in 2005.

He has coauthored four books and has published over 300 articles, papers and reports.

This NECP Seminar is jointly sponsored by the Departments of Mechanical Engineering, Chemical and Materials Engineering, Electrical and Computer Engineering and the CeNSE.

Date: Thursday, March 22, 2007

Time: 3:30pm to 4:30pm (refreshments 3:00pm)

Place: 323 CRMS

Contact: Dr. M. Pinar Mengüç 257-6336 ext. 80658

Meet the speaker and have refreshments
Attendance open to all interested persons



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