Temple University Mathematics Colloquium

Ulrich Hetmaniuk

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will speak on

Eigenspace Computations in Linear Structural Dynamics

ABSTRACT:

Eigenvalue analysis is common in many areas of engineering. For example, the knowledge of the eigenspectrum of a linear structure allows an analyst to decide whether an excitation frequency will be close to a resonance frequency, which could cause vibrations of large amplitude. The eigenpairs of a structure can also determine efficiently, in a linear superposition procedure, its transient or frequency response. Nowadays, with the demand for high-fidelity simulations, the finite element models reach frequently ten millions or more degrees of freedom and the eigensolution computes thousands of eigenpairs. For these analyses, efficient and robust algorithms are critical. The talk will review recent work on eigenspace computations in linear structural dynamics and highlight several open challenges. We will comment on state-of-the art iterative eigensolvers and present a new multigrid algorithm that uses only the algebraic information from the matrices. We will introduce an explicit a posteriori error estimator for heterogeneous elastic structures and assess its efficiency with numerical experiments.

Wednesday, 6 February 2008
Lecture at 4:00 pm
Coffee, tea, and refreshments from 3-5 pm
Room 617, Wachman Building
Department of Mathematics