



# Announcing

A COS Seminar

February 6, 2009 at 2:00 pm

SH303

at The University of Southern Mississippi

**Speaker: Dongming Wei**

Department of Mathematics  
University of New Orleans

**Title: Power-Law Nonlinear Wave Equations**

**Abstract:**

A class of nonlinear wave equations of  $p$ -Laplacian type are presented for modeling vibration of rods, beams, and plates made of some heat treated metals that satisfy a nonlinear stress-strain power-law. Some energy estimates based on appropriate norms are derived. Qualitative difference between linear and nonlinear models is presented. The corresponding second order evolution equation is examined and the theory existence, uniqueness of solution discussed. Finite element and finite difference schemes are used to fully discretize the wave equations, including linear and cubic finite elements, and some iterative finite difference schemes such as Newmark, Runge-Kutta, and others. Numerical solutions are presented and compared with analytical solutions in some cases. Convergence of the schemes is discussed. Some traveling wave solutions are also presented to illustrate the qualitative feature of these models. Finally, several associated open problems are provided and discussed.

**Further Information**

Further details and information about this and other departmental activities is available online at [http://www.math.usm.edu/bulletin\\_board/](http://www.math.usm.edu/bulletin_board/).