



THE UNIVERSITY OF TEXAS AT ARLINGTON

Department of Mathematics



## Mathematics and Statistics Colloquium

**Date/Time/Room:** Friday (3/27/2009) at 2:30 p.m. in Room 304 PKH

**Speaker:** Dr. Victor Pereyra, Weidlinger Associates Inc.

### ***Model Order Reduction for Wave Propagation Modeling and Tomography***

**Abstract:** We consider large-scale wave propagation simulation and some of its applications to seismic oil exploration and medical imaging. These are very large-scale problems that require the largest parallel computers for its numerical solution. Even today, with the largest available clusters, it is not possible to solve some of the problems that the industry requires in a reasonable amount of time.

We show here a method based on the idea of model order reduction that has become popular in attacking large dynamical systems. The method is ideal for those situations in which many closely related simulations are necessary and it relies on performing a few of them with a normal full fidelity solver. From these simulations one extracts a reduced number of time snapshots that are then used as natural modes to solve similar problems in a drastically reduced dimension via a Ritz-Galerkin collocation approach.

The numerical method that results will be illustrated in some simple wave propagation problems, including some preliminary results on full wave tomography.

\*Refreshments are served shortly after each presentation. Colloquia talks are 50 minutes long, followed by an open-forum discussion with faculty and graduate students.