TEXAS ★ STATE
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Differential Equations and Applied Math Seminar

Dr. Ray Treinen, Texas State University

11am-12pm November 1st, 2019

336 Derrick Hall

Title: Spectral Methods VII

Abstract: We will look at Spectral and Pseudospectral Methods for numerically computing solutions of certain problems.

We continue this series of lectures with stability considerations for approximating solutions of partial differential equations. We will finish our discussion of the concept that the psuedospectra of an operator provides an improved measure for creating stable numerical methods using the method of lines. We will present another example coming from an advection equation, and this example includes a parameter that gives rise to both stable and unstable methods.

We will give an overview of many popular time stepping algorithms for use in the method of lines. This will include both explicit and implicit methods, and both single step and multi-step methods.

As time permits, we will discuss how to treat the stability of nonlinear problems using the method of lines.

Our primary source material is Trefethen's *Spectral Methods in Matlab*, supplemented by Trefethen & Embree *Spectra and Pseudospectra* and Lambert's *Numerical Methods for Ordinary Differential Systems*.

Interested faculty and graduate students are encouraged to attend.