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Differential Equations and Applied Math Seminar

Dr. Ray Treinen, Texas State

12-1pm April 22nd, 2022

Zoom and 330 DH

Title: Spectral methods for bounded capillary surfaces described by generating curves

Abstract: We consider bounded capillary surfaces that are constructed by generating curves. This class of bounded surfaces includes radially symmetric and lower dimensional fluid-fluid interfaces. We use the arc-length representation of the differential equations for these surfaces to allow for vertical points and inflection points along the generating curve. These considerations admit capillary tubes, sessile drops, and fluids in annular tubes as well as other examples.

We present a pseudo-spectral method for approximating solutions to the associated boundary value problems based on interpolation by Chebyshev polynomials. This method is observably more stable than the traditional shooting method and computationally leaner and fast. The algorithm is also adaptive, but does not use the adaptive automation in Chebfun.

Interested faculty, graduate and undergraduate students are encouraged to attend.