Qualitative Analysis of a Lamé-Wave-Stokes/Navier-Stokes System

George Avalos
University of Nebraska-Lincoln
gavalos2@unl.edu

In this talk, we will discuss an appropriate Babuška-Brezzi variational formulation, and subsequent spectral and stability analysis for a multilayered structure-fluid interaction (FSI) which arises in the mathematical modeling of vascular blood flow. The coupled PDE system which we will consider mathematically accounts for the fact that mammalian veins and arteries will typically be composed of various layers of tissues: each layer will generally manifest its own intrinsic material properties, and will moreover be separated from the other layers by thin elastic laminae. Consequently, the resulting modeling FSI system will manifest an additional PDE, which evolves on the boundary interface, so as to account for the thin elastic layer. (This is in contrast to the FSI PDE’s which appear in the literature, wherein elastic dynamics are largely absent on the boundary interface.) As such, the PDE system will constitute a coupling of 3D fluid-2D wave-3D elastic dynamics. This is joint work with Pelin Güven Geredeli.