1110-35-397 **Suncica Canic***, 4800 Calhoun Rd., Houston, TX 77204, and **Boris Muha** and **Martina Bukac**. *Existence of a weak solution to a fluid-composite structure interaction problem.*

Composite materials appear in virtually all areas of engineering and in nature. No mathematical results exist so far that analyze solutions to fluid-structure interaction problems with composite structures. In this talk we make a first step in this direction. We present an existence result for a weak solution to a fluid-structure interaction problem between an incompressible, viscous fluid flowing in a cylinder with elastic walls composed of two layers: a thin layer modeled by the linearly elastic membrane shell, and the thick layer modeled by the equations of linear elasticity. This set up was motivated by blood flow in human arteries whose walls are composed of several different layers. The coupling between the three different models is accomplished at a deformed fluid-structure and structure-structure interface, via two sets of coupling conditions: continuity of velocity (no-slip) and balance of contact forces. The resulting mathematical model is a time-dependent, nonlinear moving-boundary problem of hyperbolic-parabolic type. Our theoretical and numerical results reveal a new physical regularizing mechanism for this class of problems: the inertia of the fluid-structure interface with mass regularizes the evolution of the entire solution. (Received February 24, 2015)