JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Friday, February 1, 2019
3:00 PM, 132 Gilman Hall

"*Hydrodynamics of a Poro-Visco-Elastic Drop Immersed in a Viscous Fluid Flow*"

Presented by Prof. Yuan-nan Young
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The Fluid flow through a porous medium is often modeled as either Darcy flow or Brinkman flow with the assumption that the skeleton in the medium is fixed in both space and time. However, in some real world applications the skeleton is deformable with its own dynamic characteristics that may contribute to the hydrodynamics of flow through the skeleton. In this talk I will present a two-phase fluid (coarse-grained) description of a deformable visco-elastic network immersed in a viscous fluid as a model for a deformable porous medium. Focuses will be on the applications of this model to a simple, classic fluid mechanics problem: How does a drop deform under an imposed flow? I will review some well-known examples in fluid mechanics and draw detailed comparison to highlight the effects of visco-elastic skeleton on the fluid flow around the drop. Finally, I will present results from numerical simulations of a poro-visco-elastic drop undergoing large deformations in a strong flow. Throughout the talk, I will also put emphasis on the connections between the mathematics used in the work and the physics that underlie the model.