

# PHYSICAL MATHEMATICS SEMINAR

## Modeling the fluid-structure interactions in cellular mechanics: membranes, poroelastic flow, and activity

**YUAN-NAN YOUNG**

New Jersey Institute of Technology

### ABSTRACT:

The fluid-structure interactions in cellular membranes inevitably involve three ingredients: a self-enclosing elastic membrane, a poroelastic medium for the (cross-linked) filaments immersed in a viscous fluid, and active stresses from motor proteins. In this talk I will present some of our work on each of these three types of fluid-structure interactions. (1) We propose a new model for the lipid bilayer membrane beyond the Helfrich free energy. (2) We present a two-phase flow model for the poroelastic flow inside a deformable elastic network and apply it to a poroelastic particle under linear flows. (3) We study the effects of confinement on an active suspension, and investigate how the drop deformation couples with the activity inside the drop.

**TUESDAY, SEPTEMBER 24, 2019**

**2:30 PM – 3:30 PM**

**Building 2, Room 131**

*Reception following in Building 2, Room 290  
(Math Dept. Common Room)*

<http://math.mit.edu/seminars/pms/>