1161-35-135 **Lorena Bociu**, **Suncica Canic**, **Boris Muha** and **Justin Webster*** (websterj@umbc.edu).
Multilayered Poro-elasticity Interacting with Stokes Flow.

The problem of the filtration of slow fluid flow near an adjacent poro-elastic region is classical and arises in geological and biological applications. Mathematical results are largely numerical. We are concerned with the challenging problem of a 3-D Stokes flow adjacent to a 3-D poro-elastic region, modeled by a nonlinear Biot dynamics and accounting for the Beavers-Joseph-Saffman slip coupling condition. From a rigorous point of view, such coupled systems have been rarely considered. Indeed, there are technical trace issues with respect to velocity coupling between Stokes and Biot dynamics.

In this talk, we address an intermediate model on a periodic box, where a 2-D linear, poro-elastic plate mitigates the interaction between the two dynamics. We provide an existence result for the nonlinear, quasi-static case via a spatial semi-discretization that relies on the recent theory developed in the work of Bociu et al. [2016]. After limit passage, we address uniqueness through a regularity criterion for weak solutions. As an intermediate step, we obtain existence for the linear case with time-dependent permeability, and this result is robust to Biot compressibility as well as inertial terms. (Received August 14, 2020)