1135-65-2184 **Xiaobing Feng**, **Zhihao Ge** and **Yukun Li*** (li.7907@osu.edu), Columbus, OH 43220.

Analysis of a Multiphysics Finite Element Method for a Poroelasticity Model.

This talk concerns with finite element approximations of a quasi-static poroelasticity model in displacement-pressure formulation which describes the dynamics of poro-elastic materials under an applied mechanical force on the boundary. To better describe the multiphysics process of deformation and diffusion for poro-elastic materials, we first present a reformulation of the original model by introducing two pseudo-pressures. We then propose a time-stepping algorithm which decouples the reformulated PDE problem at each time step into two sub-problems: one of which is a generalized Stokes problem for the displacement vector field (of the solid network of the poro-elastic material) along with one pseudo-pressure field and the other is a diffusion problem for the other pseudo-pressure field (of the solvent of the material). It is also proved that the solutions of the fully discrete finite element methods fulfill a discrete energy law which mimics the differential energy law satisfied by the PDE solution and converges optimally in the energy norm. Moreover, it is showed that the proposed formulation also has a built-in mechanism to overcome so-called "locking phenomenon" associated with the numerical approximations of the poroelasticity model. (Received September 25, 2017)