1163-76-1141 **Malgorzata Peszynska***, Oregon State University, Corvallis, OR 97330, and **Azhar Alhammali**, **Lisa Bigler** and **Choah Shin**. *Biofilm with multiple species: variational inequality versus other approaches.*

In the talk we consider a model for biofilm embedded in a surround liquid. Biofilms are complex structures composed of gel-like polymeric substance called EPS, and of microbial cells which produce this EPS. Given access to sufficient nutrient resources, the microbes multiply until their maximum density is achieved, after which the biofilm domain expands through the interface with the surround liquid. The liquid may provide nutrient as well as medium for microbial cells at low concentrations, i.e., planktonic cells. The liquid and biofilm are separated by a sharp or diffuse interface, and together they form a fluid with very complex properties.

Our model consists of a coupled system of partial differential equation model under constraints describing the dynamics of biofilm plus EPS and nutrient. In our prior work we studied using a system of parabolic variational inequalities for which we proved convergence of a finite element approximation scheme. However, we considered no advection. This talk is devoted to extensions of the model to multiple species, allowing for advection, as well as to a comparison with a phase field model. We evaluate practical use of our model compared to other models in the setting when the biofilm is considered as part of porous medium. (Received September 14, 2020)