1154-65-688 **Malgorzata Peszynska*** (mpesz@math.oregonstate.edu), Oregon State University, Mathematics, Corvallis, OR 97331, and **Azhar Alhammali** (alhammaz@oregonstate.edu), Imam Abdulrahman, Bin Faisal University, Dammam, Saudi Arabia. *Numerical analysis of a biofilm-nutrient model involving a variational inequality.*

We consider a coupled PDE system for biofilm and nutrient dynamics in porous media. Of interest is modeling at the interface scale of microns at which a sharp interface between the biofilm phase and the surrounding fluid is visible. The biofilm phase is where the biofilm concentration $B(x,t)$ reaches its maximum, beyond which the biomass spreads through the interface. Our model involves a variational inequality which models the constraint $B \leq B^*$ as well as nonlinear diffusivity and Monod coupling terms. The solutions are of low regularity thus we apply the low order finite element discretization, and we prove optimal convergence of our scheme, roughly of order $O(\Delta t + h)$. Numerical experiments in $d = 1, 2, 3$ confirm this rate. We also illustrate the importance of choosing a particular type of nonlinear diffusivity model which gives results qualitatively resembling experimental and imaging results. (Received September 09, 2019)