

DEPARTMENT OF MATHEMATICS AND STATISTICS
MISSISSIPPI STATE UNIVERSITY

COLLOQUIUM

Phase-Field Models for Biofilm Growth, Expansion, and Biofilm-Flow Interaction

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Abstract. We derive a set of phase field models for biofilms using the one-fluid two-component formulation in which the combination of extracellular polymeric substances (EPS) and the bacteria are effectively modeled as one fluid component while the collective ensemble of nutrient and the solvent are modeled as the other. The biofilm is assumed an incompressible continuum. Two growth modes are identified in linearized analysis. Numerical simulations are carried out in one and two space dimension using a velocity-corrected projection method for incompressible flows. Biofilm growth, expansion, streaming, rippling, and detachment are simulated in shear cells numerically. Viscoelastic properties of the biofilm is investigated as well.

Dr. Zhang is a candidate for a position in our department. There will be a reception for him in Allen 467 at 4:30 pm following his talk.

Contact Len Miller, miller@math.msstate.edu or (662) 325-7138, for additional information.