Recent Advances In Biofilm Modeling
Friday, February 14, 2014, 4:00 – 5:30 PM
1610 Industrial and Operations Engineering Building (North Campus)
University of Michigan

Abstract. While numerous models addressed various questions of biofilm development, only few studied the importance of mechanical factors and the effects of individual microbial morphotypes. This presentation will show why mass-spring mechanical models are particularly useful computational tools to study pattern formation due to cell motility, spreading of microbial colonies made of mixed cell morphotypes or interactions between fluid flow and biofilms.

Examples will illustrate the effect of cell flexibility, motility engine, guided movement, adhesion and drag forces, collision hardness, periodic movement reversal and cell population density on the alignment, circular aggregation and formation of fruiting bodies by myxobacteria. Another computational model explains how *Diatoma* chains form intricate dome-shaped structures at the river bottom, while long, dreadlock-type colonies develop in the fast flow. Finally, new individual-based models describe the effect of different cell morphotypes (spheres, rods, filaments, branched hyphae and mixtures of them) on the structure of microbial biofilms and aggregates.