

TEMPLE UNIVERSITY  
Department of Mathematics

# Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

Wednesday, 30 March 2016, 4:00 p.m.

## Diffusion Limitation in Biofilms

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### Abstract.

Biofilms are collections of microbes anchored together into sessile communities by self secreted polymers. As such the realities of biofilms as physical materials are important to their function. In particular, function is often constrained by transport of soluble quantities, such as substrates and signals, into or out of the community. However, the combination of transport with reaction can lead to spatial heterogeneity and pattern formation within the biofilm structure, even without direct biological control. Examples include formation of active layers, formation of “external” structure (like mushrooms), and formation of “internal” structure (like lumps). Conversely, such pattern formation can impact biofilm function, particularly through transport but also through mechanics. Examples include formation of microenvironments and impacts on community level transport efficiency. Relatively simple mathematical models of biofilms, coupling growth with transport, will be used to illustrate the importance of physics in biofilm form and function.