

ACMS Applied Math Seminar

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**Wed, Dec 3
129 Hayes-Healy
3:00 PM**



Flow Induced by Bacterial Carpets and Transport of Microscale Loads

Microfluidics devices carry very small volumes of liquid through channels and have been used in many biological applications including drug discovery and development. In many microfluidic experiments, it would be useful to mix the fluid within the chamber. However, the traditional methods of mixing and pumping at large length scales don't work at small length scales. Recent experimental work has suggested that the flagella of bacteria may be used as motors in microfluidics devices by creating a bacterial carpet [1]. Mathematical modeling can be used to investigate this idea and to quantify flow induced by bacterial carpets. I will introduce the method of regularized stokeslets [2] and show how this can be implemented to model fluid flow above bacterial carpets and the transport of microscale loads. Model validation and preliminary results will be presented.

[1] N. Darnton, L. Turner, K. Breuer, and H. Berg, Moving fluid with bacterial carpets, *Biophys. J.*, 86 (2004), pp. 1863-1870.

[2] R. Cortez, The method of regularized stokeslets, *SIAM J. Sci. Comput.*, 23 (2001), p. 1204.

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