

# APPLIED MATHEMATICS COLLOQUIUM

## Multiscale Modeling in Biology

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**Abstract:**

A multiscale model of blood clot formation will be described, which combines a detailed tissue factor pathway submodel of blood coagulation, a blood flow submodel and a stochastic discrete cell submodel [1,2]. It will be shown that low levels of FVII in blood result in a significant delay in thrombin production demonstrating that FVII plays an active role in promoting clot development at an early stage. We will also describe a new subcellular element method for simulating cellular blood components. In addition, multiscale models of chemotactic cell motion [3] and bacterial swarming will be discussed [4].

1. Xu, Z., J. Lioi, J. Mu, X. Liu, M.M. Kamocka, E.D. Rosen, D.Z. Chen and M.S. Alber, A Multiscale Model of Venous Thrombus Formation with Surface-Mediated Control of Blood Coagulation Cascade, *Biophysical Journal* (to appear).
2. Xu, Z., Chen, N., Kamocka, M.M., Rosen, E.D., and M.S. Alber [2008], Multiscale Model of Thrombus Development, *Journal of the Royal Society Interface* 5 705-722.
3. Lushnikov, P.P., Chen, N., and M.S. Alber [2008], Macroscopic dynamics of biological cells interacting via chemotaxis and direct contact, *Phys. Rev. E* 78, 061904
4. Wu, Y., Jiang, Y., Kaiser, D., and M. Alber [2009], Periodic reversal of direction allows Myxobacteria to swarm, *Proc. Natl. Acad. Sci. USA* 106 4 1222-1227 (featured in the Nature News, January 20th, 2009, doi:10.1038/news.2009.43).

**Monday March 8<sup>th</sup> 2010**  
**4:30 PM**  
**Building 2, Room 105**

*Refreshments are available in Building 2, Room 290  
(Math Common Room) between 3:30 – 4:30 PM*

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