



# Meiji University Global COE Program 27<sup>th</sup> Mathematical Sciences based on



## Modeling, Analysis and Simulation seminar

Date: July 8, 2010, 16:30~18:00

Location: Meiji Univ. Ikuta Campus, Build 2 Annex A, Room A207

**Shin I. Nishimura** (Hiroshima Univ.)

**Title : Strategies for Chemotaxis of Amoeboid Cells**

Abstract : Chemotactic behaviors in eukaryotic cells/animal cells are widely known phenomena. Though a straight motion toward the chemical source can be observed in chemotaxis, cells do not necessarily move in a straight way but often move in fluctuated zigzag ways. For understanding such variety of behaviors, we build a simple model for chemotactic eukaryotic cells, which describes changes in cell shape on the two-dimensional plane by considering a cell membrane, actin filaments embedded in the membrane, and an intracellular control factor. We also introduce three models of environment around cells: (a) simple chemical gradient, in which the chemical guidance (chemotactic signal) spreads everywhere in a two-dimensional field with a uniform gradient; (b) flipping chemical gradient, with which the uniform gradient is reversed at a moment everywhere in the space; and (c) a maze around a chemical source, in which maze-like walls separate the source and cells to block cell's locomotion. Some parts in those walls permeate the chemical guidance to confuse cells. The simulated results show that in the case (a) cell's behavior is most efficient when the cell takes a crescent shape like "keratocyte" and moves in a straight way. In contrast, in cases of (b) and (c) the behavior is efficient when the cell takes a typical amoeboid-like shape and moves in zigzag ways. These results suggest that the fluctuated zigzag locomotion of amoeboid cell has an advantage in some "complex" environment.

**Everyone is welcome to attend the MAS seminar.**

Meiji institute for Advanced Study of Mathematical Science (<http://www.mims.meiji.ac.jp>)  
(Organizers: M. Mimura, D. Ueyama, Y. Wakano, K. Ikeda and S. Kinoshita)

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Access: 10 minutes on foot from Ikuta St. Odakyu line,  
Or 10 minutes by bus No. 13「明治大学正門前」, get off at the last stop.  
See [http://www.meiji.ac.jp/koho/campus\\_guide/](http://www.meiji.ac.jp/koho/campus_guide/) for details.