



# Meiji University Global COE Program

## 21<sup>th</sup> Mathematical Sciences based on Modeling, Analysis and Simulation seminar



Date : April 13, 2010, 16:30 ~ 18:00

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

**Hirofumi Notsu** (Meiji Univ.)

**Title : Characteristics finite element schemes  
for flow problems**

Abstract :In this talk, finite element schemes based on the method of characteristics are considered. It is known that the conventional Galerkin method gives oscillating results for high Péclet/Reynolds number problems. To deal with such phenomena, many upwind type schemes have been developed. We focus on schemes based on the method of characteristics in the upwind type ones. The method rests on an approximation of the material derivative along the trajectory of the fluid particle, and is natural from the physical point of view. Moreover, the method has an advantage that the matrix for the system of linear equations is symmetric, which leads to symmetric linear solvers, e.g., CG method, although the convection term usually gives a non-symmetric matrix. We show usefulness of the schemes including ours with numerical examples.

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)

MAS seminar is partly supported by Meiji University Global COE program “Formation and Development of Mathematical Sciences Based on Modeling and Analysis”

(<http://gcoe.mims.meiji.ac.jp/>), the Grant-in-Aid for Scientific Research (S), “Mathematical Theory of Nonlinear-Non-equilibrium Reaction-Diffusion Systems” by M. Mimura

(<http://nnrds.math.meiji.ac.jp/>).



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.