



Meiji University Global COE Program

20th Mathematical Sciences based on Modeling, Analysis and Simulation seminar



Date: December 16, 2009, 16:30~17:30

Location: Meiji Univ. Ikuta Campus, Build 2 Annex A, Room A205

Kitsunezaki So (Nara Women's Univ.)

Title : Crack Formation Processes in Drying Paste

Abstract : A wide variety of granular materials consolidate by adding a small amount of water, as well known as clay paste and paint. Cracking induced by drying contraction is a typical solid-like behavior of paste, while water can give rheological and porous properties unlike usual solids to granular material and sand affect the cracking processes. We review two types of cracking in a uniform layer of drying paste. One is quasi 2-dimensional cracking of paste shrinking on a fixed or frictional boundary. Although resulting cellular structures, named mud crack patterns, have been studied by using an elastic theory, recent studies reveal that such cracking occurs in an early-stage of a drying process and plasticity is significantly important for both creation and growth of cracks. Another type of cracking can be observed in starch pastes in a late-stage of drying process. Cracks are formed gradually from the drying surface and develop into a 3-dimensional prismatic structure. These cracks grow with a propagating drying front, which can be explained by nonlinear water transportation in a porous material. We report analytical and numerical approaches based on spring-network models for these two types of cracking.

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 and K. Ikeda)

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(<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/ for details.