Workshop of JSPS-CNR Joint Research Project

Date:	August 3, 2012
Place:	Room number C2-101, Graduate School of Engineering, Kobe University 1-1 Rokkodai-cho, Nada-ku, Kobe 657-8501
Campus Map:	`http://www.kobe-u.ac.jp/en/access/rokko/campus.htm` (the place is at no.16)
Access Map:	`http://www.kobe-u.ac.jp/en/access/index.htm` (at Rokkodai Campus)

Program

13:00–14:00 Ulisse Stefanelli (IMATI-CNR, Pavia)

"Semilinear waves as convex minimization" (special lecture)

14:15–15:05 Hiroshi Watanabe (Salesian Polytechnic, Tokyo)

"Strongly degenerate parabolic equations with discontinuous coefficients"

15:15–16:05 Hideki Murakawa (Kyushu University, Fukuoka)

"Approximation to nonlinear diffusion problems by semilinear reaction-diffusion systems"

16:15–17:05 Takeshi Fukao (Kyoto University of Education, Kyoto)

"Abstract theory of the elliptic variational inequality and the Lagrange multiplier"

Contact

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Abstracts

Semilinear waves as convex minimization

Ulisse Stefanelli (IMATI-CNR)

I will present some recent results in the direction of a conjecture by De Giorgi on the possibility or recasting the Cauchy problem for semilinear wave equations into a convex minimization. In particular, I will comment on both the time-finite and time-infinite case as well as some related ODE questions. This is partly joint work with M. Liero (WIAS, Berlin).

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Strongly degenerate parabolic equations with discontinuous coefficients

Hiroshi Watanabe (Salesian Polytechnic, Tokyo)

We consider strongly degenerate parabolic equations with discontinuous coefficients (DP). The equation is regarded as a linear combination of time-dependent hyperbolic conservation laws and a porous medium equation. In this talk we consider about the existence and uniqueness of generalized solutions to (DP).

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Approximation to nonlinear diffusion problems by semilinear reaction-diffusion systems

Hideki Murakawa (Kyushu University)

This talk deals with nonlinear diffusion problems including degenerate parabolic problems and cross-diffusion systems. We show that the solutions of the nonlinear diffusion problems can be approximated by those of semilinear reaction-diffusion systems. This indicates that the mechanism of nonlinear diffusion might be captured by reaction-diffusion interaction.

Abstract theory of the elliptic variational inequality and the Lagrange multiplier

Takeshi Fukao (Kyoto University of Education, Kyoto)

In this talk, the characterization of the Lagrange multiplier for the abstract elliptic variational inequality is obtained. A differential equation is one of the most important tools to analyse the various scientific problem. On the leading of governing differential equations from concrete problems, the constrain different from the essential structure is convenience to represent the original complex phenomenon, than is the constrained extremal problem. On the other hand the condition of the constraint is excessive from the structure of the original equation. For example, let us consider the initial and boundary value problem for the heat equation. Under the homogeneous Neumann boundary condition, we easily see that the heat equation has the good structure of the volume preserving. However, under the homogeneous Dirichlet boundary condition, the heat equation does not have such a structure, therefore one of the idea to represent the volume preserving is the approach of the Lagrange multiplier. From this view point, Ginder (2010) consider this kind of problem, originally Svadlenka and Omata (2008) for the hyperbolic problem. In both papers, the exact characterization of the Lagrange multiplier was obtained. On the other hand, Ito, Kenmochi and Niezgódka (2007) considered the same kind of auxiliary elliptic problem, where the problem was more complicate with some nonlinear term. Then the Lagrange multiplier was constructed by the limit of the penalty term. Recently, Kubo (2012) extends their result to the abstract formulation. Based on this concept, we are sure that there are two kind of problem, one is the well-posedness which includes the existence of the Lagrange multiplier under the suitable condition and the other is the characterization of the Lagrange multiplier. The objective of this talk is to obtain the the characterization of the Lagrange multiplier from the weak formulation of the abstract elliptic variational inequality.

This is the joint work with professor Nobuyuki Kenmochi.