Mathematical Theory of Nonlinear-Non-equilibrium Reaction-Diffusion Systems

Masayasu Mimura

(Meiji University, School of Science and Technology, Professor)

【Outline of survey】

In the latter half of twenty century, we have had experienced a big scientific paradigm shift. More academically speaking, it would be a historic change from a static viewpoint of equilibrium thermodynamics to a dynamic viewpoint of nonlinear-non-equilibrium thermodynamics. For such change, mathematics at that time could not go with it, unfortunately. However, since reaction-diffusion equations appeared as mathematical models describing various phenomena arising in nonlinear-non-equilibrium sciences, a new scientific wind inspired the world of mathematics, especially the field of nonlinear analysis. Through this current, a new nonlinear analysis (more widely speaking, a group of mathematical sciences) in our country has steadily grown up in order to be able to take part in studying the new science. This circumstance has enabled us to propose the study of mathematical theory of nonlinear-non-equilibrium reaction-diffusion systems. A characteristic of this research would be that by achieving this proposal, mathematical sciences, especially nonlinear analysis could actively contribute to theoretical studies of phenomena in nonlinear-non-equilibrium sciences. This suggests that mathematics will have an interdisciplinary collaboration with other fields in sciences.

【Expected results】

A challenge of mathematical sciences, especially mathematics toward understand phenomena in nonlinear-non-equilibrium science is definitely unique and the first attempt country. The significance of this proposal implies that the field of analysis in mathemati develop widely so that it definitely related with natural science. This implies that mathe which had not have any contribution to development of theoretical study so far, will possib actively participate with several fields in natural sciences.

【References by the principal researcher】

• M. Mimura: Pattern Formation in Consumer-Finite Resource Reaction-Diffusion S Publ. RIMS, Kyoto Univ., 40, 413-1431, (2004)

• S.-I. Ei, M. Mimura and M. Nagayama: Interacting Spots in Reaction-Diffusion Systems, J. Discrete and Continuous Dynamical Systems, Series A, 14 31-62 (2006)

【Term of project】 FY2006－2010	【Budget allocation】10,600,000 yen

【Homepage address】 http://www.math.meiji.ac.jp