YOSHIDA, Nobuo Professor

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Membership of academic societies:
MSJ (Mathematical Society of Japan)

Research Interest:

- Directed polymers in random environment
- Interacting particle systems

Research Summary:

Imagine a hydrophilic polymer chain wafting in water. Due to the thermal fluctuation, the shape of the polymer should be understood as a random object. We now suppose that the water containes randomly placed hydrophobic molecules as impurities, which repell the hydrophilic monomers which the polymer consists of. The question we address here is;

How does the impurities affect the global shape of the polymer chain?

My recent research interest centers around the above question. The above question is mathematically formulated in the framework of "directed polymers in random environment" (DPRE). This can be thought of as a model of statistical mechanics in which paths of the random walk interact with a quenched disorder (impurities). We study the phase transition of this model, which depends on the dimension of the sapce and the thermodynamic parameters.

More recently, it was recognized that the DPRE is closely connected to a certain class of interacting particle systems, as well as branching random walks in random environment. This provides us with new perspectives of the research.

Major Publications:

[1] F. Comets, N. Yoshida: Localization Transition for Polymers in Poissonian Medium. Commun. Math. Phys. (to appear)

[2] R. Fukushima, N. Yoshida On the exponential growth for a certain class of linear systems. ALEA Lat. Am. J. of Prob. Math. Stat. **9** (2012), 323–336.

[3] Y. Nagahata, N. Yoshida Localization for a Class of Linear Systems. Electron. J. Prob.**16** (2011), no. 3, 657–687

[4] F. Comets, N. Yoshida Branching Random Walks in Time-Space Random Environment: Survival Probability, Global and Local Growth Rates. J. Theoret. Prob.**24** (2010), no. 3, 657–687

Awards and Prizes:

- The 4th MSJ Analysis Prize (2005)

Education and Appointments:

1991 Assistant Professor, Kyoto University
1998 Lecturer, Kyoto University
2003 Associate Professor, Kyoto University
2013 Professor, Nagoya University

Message to Prospective Students:

The text book of the seminar for graduate students will be choosen, for example from the following subjects: Brownian motion, stochastic calculus, interacting particle systems, percolation.