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Membership of academic societies:
AMS (American Mathematical Society)

Research Interest:

- Probability theory
- Branching process
- Polymer model

Research Summary:

Probability theory is used in a lot of areas, for example mathematical physics and mathematical finance. This is because we consider the observable phenomena contain some randomness (noise).

One of my interest is branching process. Galton-Watson model which is the simplest branching process was introduced to consider the extinction of the aristocratic surnames in 19th century. Nowadays, it is regarded as the stochastic model describing the number of individuals of animals. In my research, we deal with branching random walks in random environment, in which the evolution of population depends on the environment. Recently, we can obtain a certain non-linear stochastic heat equation via taking limit of this model.

Polymer model is one of the models in statistical mechanics. We consider the path of random walk as the shape of polymer and look at its behavior. In my research, we study the influence of the impurity in the media to the shape of polymers. Recently, our interest is the behavior of the free energy, which plays an important role to analyze the models in statistical mechanics, at high temperature.

Major Publications:

[1] M. Nakashima, Branching random walks in random environment and super-Brownian motion in random environment. Ann. Inst. Henri Poincaré Probab. Stat. **51** (2015), no. 4, 1251–1289.

[2] M. Nakashima, A remark on the bound for the free energy of directed polymers in random environment in $1+2$ dimension. J. Math. Phys. **55** (2014), no. 9, 093304, 14 pp.

[3] M. Nakashima. Almost sure central limit theorem for branching random walks in random environment. (English summary) Ann. Appl. Probab. 21 (2011), no. 1, 351–373.

Awards and Prizes:

- The MSJ Takebe Katahiro Encouragement Prize (2014)

Education and Appointments:

2012 Assistant Professor, Tsukuba University
2015 Associate Professor, Nagoya University

Message to Prospective Students:

Calculus, linear algebra, and measure theory are preliminary knowledge for probability theory. In the seminar for graduate students, we study for example followings:

Brownian motion, branching process, stochastic calculus, measure-valued process, polymer model.