ON COAGULATION-FRAGMENTATION PROCESSES

Dong HAN *Shanghai Jiao Tong University, China*, E-mail: donghan@sjtu.edu.cn
Chunhua, Hu *Shanghai Jiao Tong University, China*

Abstract: The coagulation-fragmentation process describes the random aggregation and breakup of clusters of particles which can model aerosols, blood coagulation, chemical polymerization and so on. Various aspects of the processes have been extensively studied by many authors ([1]-[8]). In this talk we present mainly our works on the processes in recent years, which include the existence and uniqueness of the processes in infinite dimension, stationary distributions (invariant measure), phase transition (gelation) and critical value or line ([9]-[15]).

References

[1] A. H. Marcus (1968). Stochastic coalescence, *Technometrics*, 10, 133-143.

[2] A. A. Lushnikov (1978). Certain new aspects of the coagulation theory, *Izv. Atm. Ok. Fiz.*, 14, 738-743.

[3] D. Han (1995). Subcritical asymptotic behavior in the thermodynamic limit of reversible random polymerization process, *J. Stat.Phys.*, 80, 389-404.

[4] I. Jeon (1998). Existence of gelling solutions for coagulation fragmentation equations, *Commun. Math. Phys.*, 194, 541-567.

[5] D. J. Aldous (1999). Deterministic and stochastic models for coalescence (aggregation and coagulation): a review of the mean-field theory for probabilists. *Bernoulli*, 5, 3-48.

[6] R. Durrett, B. L. Granovsky & S. Gueron (1999). The Equilibrium Behavior of Reversible Coagulation-Fragmentation Processes, *J. of Theoretical Probability* **12**, 447-473.

[7] V. N. Kolokoltsov (2004). Hydrodynamic limit of coagulation-fragmentation type models of k-nary interacting particles. *J. of Stat. Phys.* 115, 2004.

[8] A. A. Lushnikov (2006). Gelation in coagulating systems. *Physica D*, 222, 37-53.

[9] D. Han (2000). The near-critical and super-critical asymptotic behavior in the thermodynamic limit of reversible random polymerization processes. *Acta Math. Sci. Ser. B Engl. Ed.* 20, 380-389.

[10] D. Han (2003). A necessary and sufficient condition for gelation of a reversible Markov process of polymerization. *J. Physics A: Math.Gen.*, 36, 893-909.

[11] D. Han (2003). The asymptotic distributions of the size of the largest length of a reversible Markov process of polymerization. *J. Physics A: Math. Gen.*, 36, 7485-7496.

[12] D. Han & Y. L. Han (2003) Gelation of a reversible Markov process of polymerization. *Acta Math. Appl. Sin. Engl. Ser*, 19, 87-96.

[13] D. Han, X. S. Zhang & W. A. Zheng (2007). Subcritical, critical and supercritical size distributions in random coagulation-fragmentation processes. *Acta Math. Sin. Engl. Ser*, 23(8).

[14] C. H. Hu & D. Han (2007). Existence and uniqueness of infinite dimensional heterogeneous coagulation fragmentation processes. *Chinese J. of Contemporary Math.*, 27(2).

[15] C. H. Hu & D. Han (accepted). Critical behavior of heterogeneous random coagulation fragmentation processes. *J. of Physics A: Math. Theoretical.*