Texas Tech University. Pure Mathematics Colloquium.
Current Advances in Mathematics.

A survey on a critical Coagulation-Fragmentation equation

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Monday, February 1, 2021
On Zoom. Time: 4:00pm–5:00pm (Central time).

ABSTRACT. We give a survey on our new method to study a critical case of Coagulation-Fragmentation equations with multiplicative coagulation kernel and constant fragmentation kernel. Our method is based on the study of viscosity solutions to a new singular Hamilton-Jacobi equation, which results from applying the Bernstein transform to the original Coagulation-Fragmentation equation. Our results include wellposedness, regularity and long-time behaviors of viscosity solutions to the Hamilton-Jacobi equation in certain regimes, which have implications to wellposedness and long-time behaviors of mass-conserving solutions to the Coagulation-Fragmentation equation. These solve partly some long standing open problems in the field. Based on joint works with Hiroyoshi Mitake (University of Tokyo) and Truong-Son Van (CMU).