

Abstract

Catalytic and Mutually Catalytic Branching

A catalytic branching process involves a two-type population in which one type (the reactant) undergoes death/reproduction only in the presence of the other type (the catalyst). In mutually catalytic branching each type serves as the catalyst for the death/reproduction of the other type. We begin with systems of stochastic differential equations indexed by a countable abelian group describing the continuous state versions of these processes. The main goal is to discuss the existence and properties of the continuum limits of such processes. We briefly discuss the case of singular catalysts in \mathbb{R}^d . The main discussion is on the existence of the continuum limit of mutually catalytic branching in $\mathbb{R}^1, \mathbb{R}^2$ and in a related locally compact abelian group $\Omega_N^{*,\infty}$. (The results on \mathbb{R}^2 is joint work with Alison Etheridge, Klaus Fleischmann, Leonid Mytnik, Ed Perkins, Jie Xiong.) We also discuss recent work with Andreas Greven on an approach to this problem based on the hierarchical mean field continuum limit.