Hydrodynamic limits and fluctuations of binary contact path processes

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Abstract

The binary contact path process describes the spread of an epidemic on a graph, where an infectious vertex recovers at rate 1 while an healthy vertex x is infected by an infectious neighbor y at an infection rate λ. When y infects x, the seriousness $\eta(x)$ of the ill of x is added with that of y. The binary contact path process is an auxiliary model to give upper bound of the critical value of the contact process and belongs to a large family of stochastic processes called 'linear systems' introduced in Section 9 of Liggett's IPS book published in 1985. In this talk, we will introduce our results about hydrodynamic limits and fluctuations of binary contact path processes on $\mathbb{Z}^d$ with d and λ sufficiently large. We show that the hydrodynamic limit is driven by the weak solution of a heat equation while the fluctuation is driven by a generalized O-U process. The key step of the proofs is to bound the fourth moment of $\eta(x)$. This talk is based on joint works with Dr. Linjie Zhao.