

論文の内容の要旨

Spreading Dynamics on Complex Networks

(複雑ネットワークにおける伝播ダイナミクス)

氏名 曹 崑

Recently complex networks have been extensively utilized to model the world composed of entities and relations from biological and social to engineering and industrial systems, into which the introduction of only a small fraction of nodes (with a certain featured property, e.g., a communicable disease or a mutant strategy) may trigger a spreading process with its influential area covering the entire network. In this dissertation, various spreading dynamics on complex networks in a broad sense are studied. My attention is focused on, to some extent, extended classical epidemic and/or game models on continuum systems, instead of networks of contacts represented by absent-or-present links between pairs of individuals. In Chap.2, though discrete-stated classical susceptible-infected-susceptible (SIS) epidemic model are adopted, interaction patterns between entities in the network, is extended to diffusion rate between metapopulations. Chap.4 extends evolutionary prisoner's dilemma game (PDG) model by considering real-valued weighted links that represent interaction intensity between players. Moreover, Chap.3 and Chap.5 extendedly consider a continuous-stated information diffusion model and a mixed-strategy ultimate game model, respectively. Finally, I summarize the entire dissertation and end up with Appendix C that combines epidemic dynamics and game dynamics in a unified framework of diffusion-reaction processes to an arbitrary order, in the end of which I present a result on how network topologies affect the dynamical behavior that proceeds thereon.