

网络上SIR型传播的随机建模与极限定理

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Limit Theorems for Stochastic SIR Epidemics in Networks

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摘要 复杂网络本身及其上的传播过程是最近以来的研究热门, 但是多数的工作都只有宏观模型, 没有微观基础. 本文中, 我们将边与边之间的连接与个体的状态变化看作为基本的泊松流, 从微观角度构造了网络上SIR型传播的随机模型. 对任意有限的固定时间区间, 在热力学极限下, 从随机系统可以得到一个确定性动力系统---所谓的“水动力极限”. 这样, 本文为这一领域的唯象的动力学模型建立了一个合理的微观基础. 同时, 我们得到了收敛速度的估计.

关键词: 密度依赖群体过程 收敛速度 一致收敛 L_1 收敛

Abstract: Treating the instantaneous connecting of edges and the changing of individual states as fundamental Poisson flow, we construct the stochastic model from microscopic level for the SIR epidemic on networks. In thermodynamic limit, for any finite time t , we get the approximate deterministic dynamical system---the so called "hydrodynamic limit". Thus, we build a reasonable microscopic foundation for the phenomenologically built dynamical models in this field.

Key words: density dependent population process rate of convergence uniformly converge converge in L_1

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