
Graph Limits and Dynamics of Large Networks

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Abstract

The continuum limit is an approximate procedure, by which coupled dynamical systems on large graphs are replaced by an evolution integral equation on a continuous spatial domain. This approach has been useful for studying dynamics of diverse networks in physics and biology. We use the combination of ideas from the theories of graph limits and nonlinear evolution equations to develop a rigorous justification for using the continuum limit for dynamical models on deterministic and random graphs. As an application, we discuss stability of spatial patterns in the Kuramoto model on certain Cayley and random graphs.

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