

Emergent metastability for dynamical systems on networks

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Abstract

We consider stochastic dynamical systems defined on networks that exhibit the phenomenon of collective metastability—by this we mean network dynamics where none of the individual nodes' dynamics are metastable, but the configuration is metastable in its collective behavior. We will concentrate on the case of SDE with small white noise for concreteness. We also present some specific results relating to stochastic perturbations of the Kuramoto system of coupled nonlinear oscillators. Along the way, we show that there is a non-standard spectral problem that appears in all of these calculations, and that the important features of this spectral problem is related to a certain homology group.