

A spectral method for Markov lumping and its applications to dimensional reduction and renormalization

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I will discuss how a recent method for reduction of Markov chains by aggregation of states also can be used to analyze dimensional reduction in nonlinear dynamical systems and renormalization of cellular automata. The method includes many previous techniques, such as spectral graph partitioning and phase space foliation as special cases.

The method is a spectral technique based on identification of permutation symmetries (level sets) in the basis vectors spanning invariant subspaces of the linearized dynamics, i.e. a local Liouville operator.