

Balanced Truncation of Continuous-Time Markov Processes

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Abstract

Continuous-time Markov processes describe the evolution of probability (or ensemble) distributions on systems with constant transition rates between microscopic states. In this setting we explore the use of balanced truncation, a model reduction technique from robust control theory, for deriving macroscopic models of system dynamics. In particular, we aim to find free energies between macroscopic states and to identify important transition states. Applications include DNA secondary structure dynamics and tiling self-assembly processes.