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Projecting the phase-space trajectory of multidimensional non-equilibrium systems onto a discrete set of states: a Projective Dynamics approach KATJA SCHAEFER, M.A. NOVOTNY, Department of Physics and Astronomy, Mississippi State University — Phase-space trajectories, which are either continuous or possess small discontinuities, can be projected onto a discrete set of states with nearest neighbor coupling. The pointwise projection leads for non-equilibrium system to a non-Markovian process, even if the dynamics of the original system is Markovian. However, using time-averaged transition-rates a Markov process can be obtained, which has the same overall properties as the original dynamics of the system. The projected process defines a new dynamics, which only in the limit $t \to \infty$ obtains the property on the time-scale of the averaging procedure. We demonstrate the Projective Dynamics method in theory and applications to absorption processes, which in general are not describable through equilibrium or steady-state models. We show the discrete set of states $\{\zeta_k\}$ can be chosen arbitrarily (with slight restrictions) for all systems.

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