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Deterministic and randomized motions in single-well potentials

We study the Newtonian, undamped motion in single-well potentials. We investigate and compare long-time properties of fully deterministic motions in single-well potentials with analogous randomized systems. As a special special type of energy conserving randomization process we consider hard velocity reversals: $\vec{v}(t_i) \to -\vec{v}(t_i)$ at random time instants t_i. On the one hand, in the 1D case, for fixed initial conditions, the differences in probability distributions disappear in the long-time limit making asymptotic densities insensitive to the selection of random time instants when velocity is reversed. On the other hand, randomization of initial conditions (on the constant energy curve) produces densities which significantly differ from the ones recorded for fixed initial conditions. The former 1D model is extended to the 2D setup, in case of which the analysis is accompanied with the exploration of the recurrence time distributions.

Summary

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