Relaxation and Anomalous Diffusion with Metastable Initial Conditions

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Relaxation and anomalous diffusions are studied in a Hamiltonian system with many degrees of freedom and with mean-field interactions [1-3]. To be initially nonequilibrium, we take metastable states as initial conditions, where the metastable states correspond to a local but not global minimum of the free energy [4]. We show that the anomalous diffusions are not observed in the metastable and the equilibrium states, and occur in the process of the relaxation. This result differs from one with a water-bag initial condition [5]. We also investigate exponents of the anomalous diffusions and crossover times from anomalous to normal diffusions as functions of degrees of freedom [6].

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