Chaos and Ergodicity of Realistic Hamiltonian Systems
Le chaos et l'ergodicité pour des systèmes Hamiltoniens réalistes
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Fermi – Pasta – Ulam phenomenon for generic initial data

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Abstract

The main result of Fermi, Pasta and Ulam in their original report of 1955 is the following one: for initial conditions very far from equilibrium, and at low enough temperatures, the system attains an (apparent) equilibrium state of an anomalous type, presenting features very different from those characterizing the true equilibrium state. It is shown here that an analogous phenomenon occurs also at equilibrium, i.e., with initial data extracted at random from a microcanonical ensemble, if one looks at the evolution of the autocorrelations (instead than of the time–averages) of the normal–mode energies. A common feature with respect to the "standard" FPU phenomenon is that here too, at least in the so–called *alpha*–model, the high–frequency modes appear to be the frozen ones.