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The FPU problem and statistical mechanics

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Most of the investigations of the FPU model have led to the discovery of new, very interesting properties of this seminal model such as solitons, breathers, etc., creating the field of non-linear dynamics. However, the original question FPU posed was a statistical mechanical one, namely to verify the approach of a very simple system initially not in equilibrium to equilibrium. To their and most physicists consternation their model did not show this, throwing one of the basic tenets of statistical mechanics into doubt. The reasons why FPU did not find an approach to equilibrium will be discussed here as related to stochasticity thresholds in Hamiltonian dynamics and a connection with the phase space geometry of this model will be mentioned.