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Nonlinear mode coupling and vibrational energy transfer in Yukawa clusters[1] KE QIAO, JIE KONG, LORIN MATTHEWS, TRUELL HYDE, CASPER - Baylor University — Nonlinear mode coupling and the subsequent vibrational energy transfer that results is an important topic in chemical physics research, ranging from small molecules consisting of several atoms to macromolecules such as those found in proteins and DNA. Nonlinear mode coupling is recognized as the mechanism leading to ergodicity, which is a foundational tenet of statistical mechanics. Over the past two decades, Yukawa systems of particles such as those found in complex plasma, have been shown to be an effective model across a large number of physical systems. In this research, nonlinear mode coupling in Yukawa clusters consisting of 3-10 particles is examined via numerical simulation of the vibrational energy transfer between modes starting from an initial excited state. The relationship between the energy transfer process and the internal resonance between modes having a specified frequency ratio and the temporal evolution of the system to a state of equal energy across all modes, i.e., the state of ergodicity, will be discussed.

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