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Small systems of Duffing oscillators and the Fermi-Pasta-Ulam-Tsingou system An examination of the possible reasons for the unusual stability of localized nonlinear excitations in these systems RAHUL KASHYAP, ALEXANDRA WESTLEY, SURAJIT SEN, State Univ of NY - Buffalo — The Duffing oscillator, a nonlinear oscillator with a potential energy with both quadratic and cubic terms, is known to show highly chaotic solutions in certain regions of its parameter space. Here, we examine the behaviors of small chains of harmonically and anharmonically coupled Duffing oscillators and show that these chains exhibit localized nonlinear excitations (LNEs) similar to the ones seen in the Fermi-Pasta-Ulam-Tsingou (FPUT) system. These LNEs demonstrate properties such as long-time energy localization, high periodicity, and slow energy leaking which rapidly accelerates upon frequency matching with the adjacent particles all of which have been observed in the FPUT system. Furthermore, by examining bifurcation diagrams, we will show that many qualitative properties of this system during the transition from weakly to strongly nonlinear behavior depend directly upon the frequencies associated with the individual Duffing oscillators.

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