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First and second sound in strongly nonlinear lattices

Abstract:

Dynamics of strongly nonlinear lattices one often describes as "sonic vacuum", as the linear phonons do not exist and the only propagating modes are nonlinear ones.

With a finite energy density such lattices demonstrate chaotic dynamics which can be considered as a thermalized state. We show that on top of this state there are modes which can be interpreted as the first and the second sound, and describe dispersion and dissipation properties of these modes.