

Abstract Submitted
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Energy Transfers in Coupled Ordered Granular Chains with No Precompression¹ ALEXANDER VAKAKIS, ARIF M. HASAN, University of Illinois, YULI STAROSVETSKY, Technion, LEONID I. MANEVITCH, Institute of Chemical Physics, Russian Academy of Science — We study the dynamics of coupled one-dimensional granular chains mounted on elastic foundations. No dissipative effects, such as plasticity or dry friction effects are taken into account in our analysis. Assuming no pre-compression between beads, the dynamics of the system under consideration is strongly nonlinear and, in an acoustic analogy they can be viewed as ‘sonic vacua’. Sources of strong nonlinearity in these systems are nonlinearizable Hertzian interactions between adjacent beads in compression, and also possible separations between beads in the absence of compressive forces leading to bead collisions. We find that demonstrate that in weakly coupled granular chains there can occur strong energy exchanges in the form of nonlinear beat phenomena of spatially periodic traveling waves, stationary breathers or propagating breathers. We employ analytical techniques to study these dynamical phenomena.

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