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Damped driven response of granular chain

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Abstract: Over the past few decades, dynamics of one-dimensional (1D) granular lattices has become a subject of immense theoretical and experimental research. In the present talk we will discuss the fundamental problem of nonlinear wave propagation in the damped-driven, granular lattice mounted on a linear elastic foundation which assumes the general type of strongly nonlinear, inter-site potential and subject to an external harmonic forcing in the form of a traveling wave. To the best of authors knowledge this is the first theoretical study which addresses the damped-driven response of the granular lattice mounted on elastic foundation and is given to the special type of resonant external loading in the form of a traveling wave. Assuming the limit of small amplitude excitation and using the regular multi-scale analysis, we derive the discrete, damped-driven p-Schrödinger equation. In the first part of the talk we will focus on the analysis of slowly evolving, moving breather solutions forming in the non-driven — dissipative chain. Then in the second part of the talk we will present the analysis of non-linear wave solutions i.e. flat solutions as well as spatially localized (discrete breather) solutions emerging in the damped-driven granular lattice. This work was supported by Russian Foundation for Basic Research according to the research project no. 18-03-00716.

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