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The utilization of nonlinearity in periodic lattices has attracted significant research attention due to its potential to generate classes of solitary waves [1-10]. Although there are considerable number of theoretical and numerical studies on dynamics and generation of such nonlinear waves, their experimental manifestation is rather subtle, and thus their potential for engineering applications are yet to be explored. Most experimental successes have been achieved in the context of granular lattices [11-13], where the strong nonlinearity in the inter-site contact forces gives rise to non-topological solitary waves. However, experimental observations of topological solitary waves are still rare. Recently, stable propagation of topological solitary waves has been successfully demonstrated in experiments on the bistable lattices with both magnetic [14] or elastic [15] interactions. Especially, they have achieved unidirectional wave propagation and high-fidelity signal transmission by taking advantage of interplay between asymmetric on-site potentials and built-in dissipation. It has been further observed that the unidirectionality of the transition waves in the bistable lattice with magnetic inter-site forces results in lattice responses that do not depend on the types and intensity of the input excitations, as long as the state transition of the excited element can be made by any means [16]. This response invariance offers ideal implementation for broadband energy harvesting and protective metamaterials. In this study, we explore possibility to achieve similar input-independent dynamics in the bistable lattices with elastic interactions, which can be beneficial to expanding the lattices' functional properties in that additional functional direction (i.e. tensile direction) and wave modes (i.e. rarefaction waves) are available. In addition, in the context of periodic bistable lattices, unidirectionality applies to either kink soliton or anti-kink soliton but not both for a given lattice setup. We also present an intrinsic adaptable mechanism that enables unidirectional propagation of both types of solitons in a single lattice.

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