

Abstract Submitted
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Solitary Wave Propagation through 2D Tree-like structures¹

WILLIAM FALLS, SURAJIT SEN, State University of New York, Buffalo, New York — It is well known that a velocity perturbation can travel through a mass spring chain with quadratic and quartic interactions as a solitary and antisolitary wave pair. In this talk we first consider the propagation of such a velocity perturbation for cases where the system has a 2D “Y” shaped structure. Where each of the three pieces that make up the “Y” are made of a small mass spring chain. From there we consider the case where multiple “Y” shaped structures are used to generate a “tree” shaped network. We examine the energy transmission properties on these “tree” shaped structures and our findings suggest the following broad observations: (i) for strongly nonlinear interactions, mechanical energy propagation resembles pulse propagation with the energy propagation being dispersive in the linear case, (ii) for strongly nonlinear interactions, the “tree” like structure acts as an energy gate showing a directional dependence of the perturbation made to the system while the behavior of the linear case shows no such preference, thereby suggesting that such nonlinear structures can act as switches for mechanical energy.

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