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Nonlinear energy transport in one-dimensional lattices P. VUPPULURI, M. HAMILTON, O.F. DE ALCANTARA BONFIM, University of Portland — We present a simple lattice model consisting of a one-dimensional chain, where the masses are interconnected by linear springs and allowed to move in the horizontal direction only, as in a monorail. In the transverse direction each mass is also attached to two other springs, one on each side of the mass. The ends of these springs are kept at fixed positions. The nonlinearity in the model arises from the geometric constraints imposed on the motion of the masses, as well as from the configuration of the springs. In the transverse directions the springs are either in the extended or compressed state depending on the position of the mass. Under these conditions we show that solitary waves are present in the system. In the long wavelength limit an analytical solution for these nonlinear waves is found. Numeric integrations of the equations of motion in the full system are also performed to analyze the conditions for the existence and stability of the nonlinear waves. Nonlinear supratransmission is examined and shown to exist in the model and an explanation of its mechanism is presented.

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