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Geometrically induced nonlinear dynamics in one-dimensional lattices MERLE D. HAMILTON, O.F. DE ALCANTARA BONFIM, University of Portland — We present a lattice model consisting of a single one-dimensional chain, where the masses are interconnected by linear springs and allowed to move in a horizontal direction only, as in a monorail. In the transverse direction each mass is also attached to two other linear 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, where in the transverse direction the springs are either in the extended or compressed state depending on the position of the masses. Under these conditions we show that solitary waves are present in the system. In the long wavelength limit an analytic solution for these nonlinear waves is found. Numerical 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.

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