MATHEMATICAL MODELING AND NUMERICAL RESULTS ON THE PROPAGATION OF SOLITARY WAVES ON TENSEGRITY LATTICES

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This work investigates the existence and properties of solitary waves on 1D tensegrity metamaterials formed by chains of tensegrity prisms and lumped masses (Figure 1), through the Weinstrass's theory of 1D Lagrangian conservative systems [1].
We investigate on the wave equation of such a system and the existence of solitary waves with compact support, under suitable conditions on the phase velocity.
The support of the solitary waves also varies with the wave speed, determining the wave localization on a single unit in the high energy limit. Numerical simulations confirm the analytic results and show evidence of the dependence of the wave form on the speed of the propagating solitary wave.

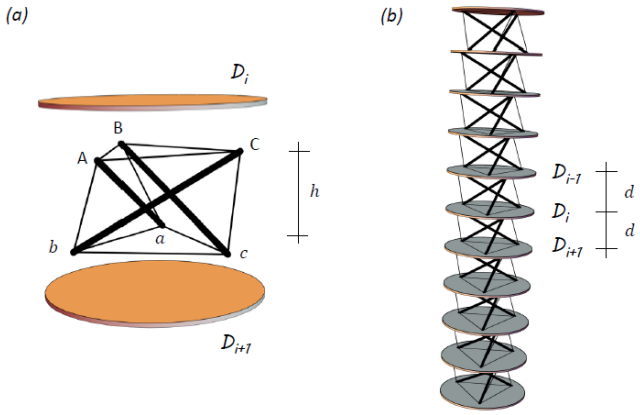

Figure 1: One-dimensional array of tensegrity units. (a) The generic unit is formed by a minimal regular tensegrity prism, which is frictionless contact with two terminal discs. (b) A one-dimensional lattice is obtained by alternating lightweight tensegrity prisms and spacing discs acting as point masses [2].

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