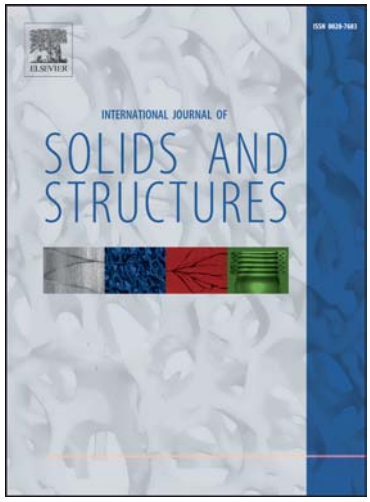

An operative algebraic formulation for the unilaterally-constrained mechanical problem of smart tensegrities

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An operative algebraic formulation for the unilaterally-constrained mechanical problem of smart tensegrities

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Magni mechanicorum magistri J.J. Moreau memoriae dicamus, dum haec perficiuntur paginae eheu nobis adempti.

Abstract

Kinematics and statics of tensegrities are addressed by means of a novel algebraic formulation. The inequality constraints, associated to cable-type unilateral structural members, are explicitly enforced in the equilibrium and compatibility problems. Fundamental tensegrity properties (rigidity, pre-stressability, and stability) are focused by a novel structural perspective and algebraic criteria for their assessment are established. Some classical results are generalized to the case of tensegrity models involving both deformable and non-deformable structural members. An operative algorithm for the analysis of the large-displacement elastic tensegrity response is proposed, not limited by special requirements in terms of structural symmetries or member connectivity, and therefore resulting a general design tool. Exemplary applications

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