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NONLINEAR MULTI-SCALE MODELING WITH FRAME ELEMENTS FOR CELLULAR MATERIALS
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The development of a nonlinear homogenization for media having lattice-like periodic microstructure is presented. For continuum media, conventional homogenization methods lead to classical continuum boundary value problems at both micro- and macro-scales. However, discretizing latticelike micro-structures, such as cellular solids, by frame elements is a natural step. The main difficulty in applying frame elements to micro-scale problems is inconsistencies between the kinematic field of the frame elements and the micro-scale displacement field. Numerical examples of cellular solids demonstrate the feasibility and strengths of the computational efficiency of the method presented.

Key Words: multi-scale modeling, bifurcation, homogenization method, non-convex potential, cellular materials

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