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The equilibrium cell-based smooth finite element method for shakedown analysis of structures

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ABSTRACT

This paper presents a novel numerical procedure for quasi-static shakedown analysis of structures. The cell-based smooth finite element method (CS-FEM) is employed, leading to the fact that all constrains can be imposed at only one in the smoothed domain, instead of Gauss point as finite element method (FEM). The equilibrium of shakedown analysis is formulated in the combination with second-order cone programming (SOCP). The optimization problems then are handled using the highly-efficient solvers and the numerical examples are investigated. Numerical solutions obtained by the proposed equilibrium cell-based formulation are compared with available results in the literature to demonstrate the efficiency of proposed method.

KEY WORDS: *Shakedown analysis, second-order cone programming, smoothed finite elements.*

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