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Analysis of bi-dimensional solids with internal unilateral constraint coupled to structural elements with different degree of connection

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Abstract

The paper focuses on the modelling and analysis of 2D solids with unilateral material constraints coupled to 1D elements with varying degree of connection between each other. Both bilateral and unilateral geometric constraints are considered, depending on the connection degree. The problem is set up, and the solution is searched for by the numerical implementation of an iterative process leading to its identification; the solution pattern follows a bi-phase minimization procedure that is realized at any step, gradually tending to satisfy all the equations and the inequalities governing the problem. Original numerical codes, specifically compiled for the problem, allow to analyse the influence of the connection on the overall behaviour of the coupled system. The presented problem finds application, as an example, in the study of non-structural brick elements, and it allows to produce some reliable prediction of the overall behaviour of a structure, which includes such elements. © 2016 Springer-Verlag Wien

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Degree of connection; Geometric constraint; Iterative process; Minimization procedures; Modelling and analysis; Numerical implementation; Structural elements; Unilateral constraints

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