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Masonry-like material with bounded shear stress

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Abstract

The constitutive equation of masonry-like materials has been generalized in order to account for a limit to the tangential component of the stress, that is proportional to the normal component. This result has been achieved by suitably modifying the convex set made up of all the admissible stresses. The constitutive equation obtained in this manner retains all the properties of normal elastic materials. The model developed has been implemented in the FEM computer code MADY, and applied to the study of masonry shear-walls and arches under monotonic in-plane loads. The reliability of the proposed model is checked through comparisons with some experimental results.

Keywords: Masonry, Nonlinear elastic, Shear, Panels, Finite elements

1. Introduction

The study of masonry constructions, including the development of models suitable for predicting their structural behavior, still remains one of the most interesting open issues in civil engineering.

Within the framework of continuum models, to date, two main approaches have been proposed: that underlying the so-called no-tension or masonry-like materials model[1], [2], [3], [4] in which masonry is considered as an isotropic non-linear elastic material, and a class of more refined but complex models, that also account for the material's anisotropy, its texture, etc. [5], [6], [7], [8].

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