NEW TRENDS IN COMPUTATIONAL MODELLING OF MASONRY MATERIAL AND STRUCTURES

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ABSTRACT

Masonry structures and infrastructures represent a large part of the European historic and architectural heritage, but also characterize the modern building constructions of some major countries. Scientific community devoted large efforts over the past decades to develop reliable models for masonry and deliver efficient and accurate procedures for the assessment of their structural safety, also aiming at designing repairing and strengthening interventions when required.

A huge number of approaches have been proposed and applied for the analysis of both ancient and modern masonry structures [1]. However, this is still a challenging and interesting task deserving attention to improve existing procedures and propose new approaches characterized

by optimized performances in terms of accuracy and computational costs, as well as capability to interact with material testing methods for the definition of model's input parameters [2].

Computational modelling techniques are the most adopted today, thanks to the increasing availability of computational resources and the advancements in numerical tools for structural analysis. These are aimed at describing masonry structural response under static and dynamics loading conditions, such as earthquakes [3], ground settlements, environmental actions also due to climate change and so on.

Classical and enhanced finite element procedures have been widely developed, where nonlinear constitutive laws capable of reproducing the main nonlinear mechanisms characterizing masonry response have been introduced. However, other alternative approaches have been successfully adopted. Various criteria can be adopted for classifying masonry modelling procedures. As for example, the existing numerical strategies could be subdivided into the following four classes [4]: block-based models, continuum models, geometry-based models, and macro-element models. Also, the scale at which masonry is analyzed can be used to distinguish between micromechanical, macromechanical and multiscale models [5].

The aim of the proposed mini-symposium is to collect the most recent research contributions to this field and discuss the current issues and future developments concerning masonry computational modelling.

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