

New trends, challenges, and visions in block-based modeling techniques for masonry

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This mini-symposium aims at favoring a debate and collecting research contributions on new trends in block-based modelling techniques for masonry. On-going research developments and work-in-progress contributions are particularly welcomed to promote discussions and share ideas and visions on this field of solid mechanics.

Masonry mechanics, characterized by highly nonlinear and anisotropic material behavior, is still fascinating scientists and researchers. Indeed, the heterogeneous nature of masonry, composed of blocks connected by mortar (or even dry) joints, makes particularly challenging its assessment. In the last decades, many approaches have been proposed to model masonry mechanical behavior, following different hypotheses and implementing various computational strategies.

In this framework, block-based modelling approaches, able to consider masonry at the scale of its main heterogeneity, have found significant interest in the scientific community and remarkable growth in the last years. These models are recognized to be the most accurate ones to simulate masonry mechanical response, since they account for the actual masonry texture, which governs material anisotropy and the potential failure pattern of structural elements. Block behavior can be assumed rigid or deformable, while block interactions can be described by means of various suitable formulations (e.g. interface elements, contact, etc.).

The main drawback of block-based models is typically given by their huge computational demand, which limits full-scale applications. Even if this issue appears solvable soon, thanks to the rapid enhancement of the computational facilities, new approaches represent a challenge for an accurate assessment of masonry mechanical behavior.