

Mini-symposium 7.2: Structural analysis of historical buildings

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The aim of this mini-symposium is to provide a forum for the presentation and discussion of the most recent developments in the fields of mechanics, numerical simulation and assessment of historical masonry structures.

The restriction to historical constructions excludes reinforced masonry structures in the modern sense, that is structures designed to sustain locally, besides compression, tensile internal forces.

Historical masonry structures behave differently from modern structures. They are designed to work in compression since their tensile strength is feeble and one cannot depend on it for safety. They are stocky and local stresses are usually much lower than the crushing strength. These structures are able to adapt to changes of the boundary conditions and to the insults of the environment and, by developing cracks at their interior, settle through small displacements into more comfortable equilibrium states. Finally, as a consequence of their essentially unilateral behavior, the stability of the construction depends mainly on shape rather than on strength.

This said, the mechanical modelling of this kind of structures has to give answers to the most difficult challenges of Mechanics, namely: the effect of contact, friction and fracture. These non-linear, non-smooth, non-convex problems cannot be solved through standard numerical tools, such as commercial FEM packages, unless clearcut simplifying assumptions are introduced and, at the same time, new numerical tools based on a more sensible modelling and on a more culturally aware approach are developed.

The session besides general contributions to masonry mechanics, aims to incorporate contributions pertaining to a wide range of masonry structure types, assemblies and components, such as: common buildings, churches, palaces and castles, towers and the refined study of their elements such as arches, vaults, domes and buttresses.