

## Seismic vulnerability of the Concordia temple

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### Abstract

In the last years a strong need concerning the seismic risk protection of archaeological heritage, respectful of the purpose of the original design, has been established. The work reported in this paper aims at providing a contribution towards the seismic risk evaluation and mitigation of particular archaeological structures such as the greek temples. In particular, the work focuses on the Concordia temple, situated in the Valley of the Temples in Agrigento (Italy). In the paper a general methodology to assess the seismic vulnerability, to be applied to any kind of structures composed of stone blocks, is proposed. More precisely, the blocks have been modelled, by considering their real geometry, as rigid three-dimensional elements separated by nonlinear interfaces. In particular, each interface is represented by a discrete number of no-tension elasto-plastic springs allowing for the relative rotation between adjacent blocks. Along the interfaces the nonlinear elastic behaviour of the blocks, according to a fibre model representation, is also concentrated. The case study can be recognised as representative of a wide class of greek temples showing geometric and constructive similarities. The vulnerability assessment has been conducted by means of equivalent nonlinear static analyses along the principal directions of the structure and the subsequent identification of an equivalent single degree of freedom system. Furthermore the seismic vulnerability has been expressed both in a deterministic and a probabilistic context, the latter by evaluating the collapse probability.

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