

The contribution of structural modeling to understand the original shape of a disappeared Parthian dome

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Abstract: The study of an archaeological site with the perspective of historical building technique and of materials mechanics has given an unusual support to the development of new knowledge in ancient architecture. Starting from a geometrical and proportional inspection of the archaeological remains of the Round Hall in Old Nisa and from the study of similar buildings in the Persian area, different shapes have been proposed for the missing dome. The mechanical characteristics of the materials have been measured with a portable testing machine especially designed for in-situ testing (uni-axial compression, three point bending, and Brazilian). For each hypothesized shape, the static behaviour was analyzed by means of non-linear finite element analysis, adopting the material properties and the stress-strain relationships measured in situ. This allowed to list the dome shapes, according to their safety factors, thus identifying the shapes which would have guaranteed a better stability to the building.

Keywords: Dome shape, adobe, structural modelling.