

Numerical analysis of tensioned, masonry ring of the rotating dome

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Abstract This paper deals with the static behaviour of rotating domes with regard to their latitudinal strengthening. The internal forces in the dome under a prescribed system of loads, and an equivalent system of a single ring under tensile forces are presented. Comparative analyses for the analytical solution and the numerical solution of the rotating dome and the masonry ring are carried out. The problem of determining the tensile strength of masonries as composites modelled by quasi-brittle materials is discussed. In addition, the assumptions for analyses based on the membrane theory are discussed and an error which may arise if shell thickness is not taken into account is indicated. After the masonry structure is homogenized an FEM analysis is carried out using the macromodelling method to describe the static behaviour of the model. It is demonstrated that studies of masonry rings are useful with regard to the effectiveness of the latitudinal strengthening of the dome's double-curvature shell system.

Keywords dome, ring, FEA