

The Dome of Santa Maria del Fiore in Florence: Monitoring and Structural Analysis

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Abstract In the paper, the identification of the static and dynamic behaviour of the Brunelleschi's Dome of Santa Maria del Fiore is discussed. Firstly, a brief description of the main geometric characteristics and the relevant constructive aspects ideated by Brunelleschi are sketched. The present cracking pattern is analyzed jointly with the experimental in-situ investigation made in the nineties. Then a finite element model built to assess the static and dynamic behaviour of the Monument, identified by using the results of previous in-situ investigation, is described. By means of the Finite Elements technique, using an “ad hoc” procedure to replicate the non linear behaviour of masonry, both the internal stress and the cracking pattern in the Dome have been assessed and discussed. The paper, by showing how advanced numerical analyses can provide useful information to evaluate the existing damage on Monumental buildings, offers a contribution in the assessment of the safety and vulnerability of one of the most emblematic masonry domes all over the world.

Keywords numerical modelling, static assessment, dynamic assessment, non-linear analysis.