

Structural analysis of polygonal masonry domes. The case of Brunelleschi's dome in Florence

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Abstract The paper deals with the structural analysis of polygonal masonry domes provided with thickness. A numerical procedure is presented through which the actual behaviour of the material is considered in the analysis. The structure is modelled as a discrete system of rigid blocks linked through elastic mortar layers. No-tension behaviour of the material is supposed totally concentrated in the mortar joints located in between the adjacent blocks. Such a joint can therefore be assumed as an unilateral elastic contact constraint. The solution is achieved by a step by step algorithm in which the starting solution, relative to the *standard material* (linear elastic and bilateral), is subsequently corrected according to the actual material skills. The numerical procedure can be applied to the analysis of any type of polygonal masonry domes, with spherical or pointed shape, subject to self weight loads, complete or with hole and lantern. As a particular case of analysis, some interesting remarks dealing with the case of Brunelleschi's Dome are presented.

Keywords masonry dome, no-tension analysis, numerical method

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