

LIMIT ANALYSIS OF NON-PERIODIC MASONRY BY MEANS OF DISCONTINUITY LAYOUT OPTIMIZATION

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Historical masonry buildings were commonly composed by walls having irregular bonding patterns called non-periodic texture. The latter may be defined as quasi-periodic if it has horizontal courses, each one with a defined height, while the units within the course may have variable width. If the texture doesn't even have horizontal courses it may be called chaotic. For a periodic texture, several methods are present in literature (see [1] for a discussion). For non-periodic masonry instead, the determination of the load that the wall can carry is tough and in [2] Discontinuity Layout Optimization for a rigid block analysis has been used to determine the influence of such textures on the failure multiplier. DLO was proposed in ([3], [4]) and it allows to perform a limit analysis identifying the failure mechanism among several by means of linear programming techniques. In a recent work by some of the authors [5], the effect of the variation of three different textures, the variation of the size and shape of the panel and the mechanical properties have been addressed.

In this paper, a further classification for the quasi-periodic texture is provided and the textures are analysed through DLO both for a rigid block model approach and for an homogenized smeared approach.

The key parameter used for the homogenized model is the Aspect Ratio of the blocks, namely the ratio between the width and the height of the element; the way it is individuated throughout the wall varies from one approach to another.

Results shows that when the wall is composed by an high number of elements, the homogenized models are representative and are also a safe lower bound. Some exceptions are then identified and discussed.

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