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Contribution of the fill to the static behaviour of arched masonry structures: Theoretical formulation (Article)

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Abstract

In the paper, one presents the theoretical set-up of an original formulation aimed at accounting for the contribution of the fill to the structural strength of masonry vaults and arches and at providing an evaluation about its skill of cooperating to stress absorption with the main vaulted resisting structure. Usually the action of components ordinarily regarded as non-structural members is often neglected in static analyses. Actually, it is a common practice to assume a number of elements of vaulted or arched constructions, such as the fill and the buttress, as completely unable to exert any structural action, rather than trying to evaluate their contribution; therefore, those are usually assumed to be a dead weight, unable to contribute to the bearing capacity of the vault. Starting from the consideration that the fill is somehow subject to some pre-compression because of the permanent load, an approach is proposed where the fill is considered to be able to provide a partial absorption of the variable loads with a reduced load transmission onto the main structural members. The procedure leads to more realistic evaluations about the safety assessment of vaulted structures, which are in major agreement with their real behaviour. © 2013 Springer-Verlag Wien.

Indexed keywords

Load transmission; Masonry structures; Partial absorption; Realistic evaluations; Safety assessments; Stress absorption; Structural strength; Theoretical formulation

Engineering controlled terms: Masonry materials

Engineering main heading: Arches

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