17th Symposium on Earthquake Engineering
November 14-17, 2022
IIT Roorkee, India
Paper No. 479

Structural Performance of Retrofitting Strategies for Dry Stone Masonry Arch Structures

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Abstract

Stone Masonry has been one of the most used construction types in India since ancient times, where most of these structures are constructed using locally available stones or commonly available sandstone, basalt, granite and other stones. These age-old stone structures have suffered damage over a period of time, and these structures have not been appropriately maintained. Often these structures require strengthening and repairment strategies for local and global performance re-establishment and sometimes enhancement. Before deciding on these strengthening strategies, studying the basic strength characteristics, material and structural compatibility, and breathing characteristics of the repair material is essential. These strategies also vary due to structural and architectural demands for a particular structure. Together with the inherent uncertainties in material and structural level, high inertial forces proportional to the high mass of the structure make these unreinforced masonry buildings vulnerable to earthquakes and other static and dynamic loadings. This paper compares state-of-the-art commonly prevalent retrofitting strategies used to strengthen stone arches. The study is also focused on some of the recent development in this field. The issues with respect to the analysis of dry jointed arches and the applicability of different repair strategies have been discussed in detail. The study also points out some of the common limitations and shortcomings of different strategies. The behaviour of various retrofitting strategies for stone masonry arch structures has been demonstrated and compared in the presented study.

Keywords: Heritage, Stone masonry, Arches, Un-reinforced Structures, Retrofitting