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Seismic Behaviour of Dry Stack Stone Masonry - A Numerical Study

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Abstract

Most of the studies on structural masonry are focused on the units that are bonded together with mortar, i.e., wet jointed. However, dry stack masonry also constitutes a good amount of building stocks in ancient Indian Structures, especially in the case of stone. These historical dry stack masonry structures, such as plinths, walls, arches, vaults, and domes, were generally constructed as compression-only structures. However, these structures pose a high risk of damage due to huge inertial force during an earthquake. The failure modes of these structures during a seismic event depend on the structural configuration and intensity of the earthquake. The jointing arrangement of these structural stone masonry units also plays a vital role in their load transfer mechanism and dissipation of any lateral forces. The present study is focused on the seismic behavior of the dry stack structures having different joinery arrangements. A numerical study has been carried out on a FEM-based numerical platform to simulate the seismic behavior of stone masonry. The arrangement of stone units has also been varied to obtain the improved response of different dry stack masonry structures. The response of several structural arrangements has been compared with different intensity earthquake forces. The study presents the effect of structural configuration and joinery on the overall structural performance of the dry jointed stone structure through a numerical investigation.

Keywords: Heritage structures, Dry jointed, Un-reinforced masonry, Load transfer