

Performance of Stone and Timber-Laced Unreinforced Masonry Buildings During the 2023 Kahramanmaraş Earthquakes in Türkiye

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Abstract:

This study describes observations on the earthquake performance of unreinforced masonry buildings from a reconnaissance mission following the 2023 Kahramanmaraş earthquake sequence. The area affected by the earthquakes is home to a remarkably diverse masonry building stock, which is introduced first. Specific attention is given to the stone and timber-laced unreinforced masonry constructions, which are the most common typologies. Then, an overview of the dominant collapse mechanisms in wall structures is presented, with a view to highlighting key features that affected the seismic performance. It is observed that buildings with negligible or minor damage indicated good quality construction, where connection detailing enabled box behavior during the earthquake sequence. In contrast, lack of proper connections among load-bearing walls, internal disaggregation of masonry due to poor construction quality, poor timber connections and the use of incompatible strengthening interventions prevented box behaviour and led to partial or complete collapses. Observations of building features that improve seismic performance (e.g., through stones, timber beams, tie rods, ring beams) are highlighted.

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