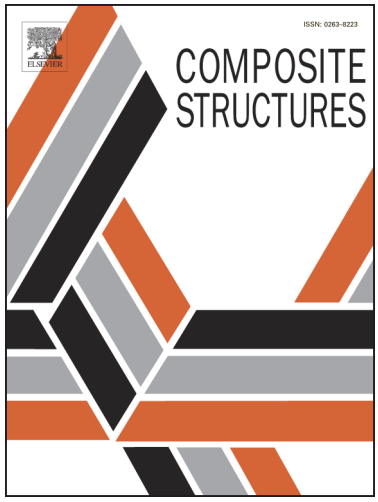

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EXPERIMENTAL STUDY ON SHORT RUBBERIZED CONCRETE-FILLED STEEL TUBES UNDER CYCLIC LOADING

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Abstract: This paper presents an experimental investigation on the cyclic behaviour of short steel tubes filled with Rubberized Concrete (RuC), a composite material that mixes concrete with rubber particles. A brief literature review on the cyclic behaviour of CFST columns, the mechanical properties of RuC and recent research on RuC-Filled Steel Tubes (RuCFST) is presented. Then, the tested specimens are characterized, comprising three cross-section shapes (square, rectangular, circular), three steel grades (S235, S275, S355), three concrete mixes (0%, 5%, 15% of rubber particles content) and two axial load levels (10%, 20% of axial plastic load). After that, the loading protocol, test rig and experimental procedure are described in detail. The experimental results are extensively discussed, focusing on the column cyclic strength, failure modes, hysteretic and envelope curves, as well as on the energy-based ductility factors. Finally, conclusions are drawn regarding all these parameters. The most relevant achievement is that a concrete mix with a low content (5%) of rubber particles leads simultaneously to the lowest decrease (5%) in the cyclic strength and the highest increase (52%) in the ductility of RuCFST columns, thus being the most suitable mix to use in seismic areas, where ductility and energy dissipation requirements are mandatory.

Keywords: Rubberized Concrete (RuC); Concrete Filled Steel Tubes (CFST); Cyclic behaviour; Experimental testing; Strength and ductility; Local buckling