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Experimental Studies of Spiral-Confined HSCFST Columns under Uni-Axial Compression

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Abstract : Concrete-filled-steel-tube (CFST) columns are becoming increasingly popular owing to the superior behavior contributed by the composite action. However, this composite action cannot be fully developed because of different dilation properties between steel tube and concrete. During initial compression, there will be de-bonding between the constitutive materials. As a result, the strength, initial stiffness and ductility of CFST columns reduce significantly. To resolve this problem, external confinement in the form of spirals is proposed to improve the interface bonding. In this paper, a total of 14CFST columns with high-strength as well as ultra-high-strength concrete in-filled were fabricated and tested under uni-axial compression. From the experimental results, it can be concluded that the proposed spirals can improve the strength, initial stiffness, ductility and the interface bonding condition of CFST columns by restraining the lateral expansion of steel tube and core concrete. Moreover, the failure modes of confined core concrete change due to the strong confinement provided by spirals.

Keywords : concrete-filled-steel-tube, confinement, failure mode, high-strength concrete, spirals
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