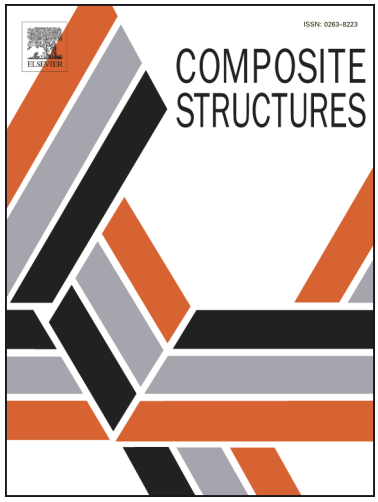

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Behaviour of concrete confined by both steel spirals and fiber-reinforced polymer under axial load

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Abstract: The experimental results for the behaviour of concrete columns confined by both steel spirals and fibre-reinforced polymer (FRP) are presented. A total of fifty-six columns were investigated experimentally under axial load. The test program involves the number of FRP layers (1 or 2 layers), the type of FRP (CFRP and BFRP), and the spacing of the steel spirals. The test results show that both FRP and steel enhance the ultimate concrete strength and strain. The strength and ultimate deformation ability of the concrete increase as the number of external FRP layers increases or the spacing of steel spirals decreases. The compressive response of concrete columns confined by both steel spirals and FRP shows a similar trend with steel spiral-confined columns after FRP rupture, as determined by the spacing of the steel spirals. The residual strength increases, and the stress degradation rate decreases as the spacing of the steel spirals decreases. A new model is presented for evaluating the axial strength of concrete confined with both FRP and steel, and the model may accurately predict the ultimate strength of FRP-steel-confined concrete with both sufficient and insufficient confinement.

Keywords: Concrete, confined, compression, steel spirals, fibre-reinforced polymer, FRP-steel-confined, compressive behaviour

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