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学术论文

钢骨-钢管自密实高强混凝土偏压柱力学性能试验研究

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摘要: 为研究钢骨-钢管混凝土组合柱在偏心荷载下的力学性能,进行了13根组合柱的偏心受压试验,研究了钢骨-钢管自密实高强混凝土偏压柱的荷载-变形关系曲线、宏观变形特征和破坏形态,分析了偏心率、长细比、套箍系数和配骨指标对偏压组合柱力学性能的影响。研究结果表明:内置钢骨能延缓甚至阻止核心混凝土中剪切斜裂缝的开展,可有效提高偏压组合柱的极限承载力和延性;在整个加载过程中,钢骨-钢管自密实高强混凝土偏压柱中截面纵向应变沿截面高度的变化基本符合平截面假设,且偏压长柱的侧向挠曲线基本符合正弦半波曲线;钢骨-钢管自密实高强混凝土偏压柱的极限承载力随偏心率和长细比的增大而急剧下降,随着配骨指标的增大而提高。

关键词: 组合柱 偏压 自密实混凝土 高强混凝土 静力试验 极限承载力

Experimental study on behavior of eccentrically loaded steel-reinforced self-compacting high-strength concrete filled steel tubular columns

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Abstract: In order to study the behavior of eccentrically loaded steel-reinforced self-compacting high-strength concrete filled steel tubular columns,tests on thirteen composite column specimens subjected to eccentric compression were carried out.Load-deformation curves,macroscopical characteristics of deformation,as well as failure modes of the composite column were studied.The effects of the eccentricity ratio,slenderness ratio,confinement coefficient and structural steel index on the mechanical properties of the composite column were discussed.The results show that the propagation of cracks in core concrete can be put-off or avoided by the inserted structural steel,so the ultimate bearing capacity and ductility of the composite column is effectively improved.In the whole loading process,the steel tube longitudinal strain distribution along the depth of cross-section approximately follow the plain section assumption,and the deflection curve of eccentrically loaded slender columns is basically in accordance with half-sine-wave curve.The ultimate capacity of the composite column decreases with load eccentricity ratios and slenderness ratio increasing,increases with structural steel index increasing.

Keywords: eccentric compression self-compacting concrete high-strength concrete static test ultimate bearing capacity

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