Nonlinear Finite Element Analysis of Hysteretic Behavior of Circular Steel Tube-Steel Section-Recycled Concrete Composite Columns (Postprint)

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Abstract

Based on low-cycle reversed loading test studies of circular steel tube steel-reinforced recycled concrete composite columns, numerical analysis of the hysteretic behavior was performed using OpenSees software, obtaining the hysteretic curves and seismic performance indices of the composite columns, which were compared with test results to verify the rationality of the numerical model. On this basis, a parametric analysis of the hysteretic behavior was conducted. The results indicate that: when the recycled aggregate replacement ratio increased from 0 to 100%, the peak load of the composite columns decreased by 7.78% with a slight reduction in ductility; increasing the strength of recycled concrete, steel section, and circular steel tube is beneficial for improving the bearing capacity and stiffness of the composite columns, but increases their brittleness; as the axial compression ratio increases, the bearing capacity of the composite columns exhibits a trend of first increasing and then decreasing, while the ductility gradually deteriorates; when the steel ratio of the steel section increased from 5.54% to 9.99%, the peak load of the composite columns increased by 24.34%, but the improvement in ductility was not significant; increasing the wall thickness of the steel tube is beneficial for both the bearing capacity and ductility of the composite columns.

Full Text

Preamble

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