

世博会工程专辑

世博会主题馆预应力混凝土梁-钢骨变截面劲性柱节点设计及试验研究

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摘要:

为研究预应力混凝土梁-钢骨变截面劲性柱节点的破坏特征及受力性能,进行了4个模型试件的低周反复荷载试验。观察了各节点的受力过程及破坏形态,并分析了试件的荷载-位移滞回曲线、骨架曲线、承载能力和延性等力学特性。结果表明:预应力混凝土梁-钢骨变截面劲性柱节点典型破坏形态是梁端弯剪破坏,该类节点的延性与混凝土梁柱节点相似,位移延性系数为2.0,柱内钢骨可提高节点的承载能力及刚度;柱内钢骨变截面可有效改善节点的延性性能,而对承载能力没有影响;节点处混凝土的浇筑质量对节点的整体受力性能影响较大。最后对该类节点给出了设计及施工建议。试验研究成果可为预应力混凝土梁-钢骨变截面劲性柱节点工程研究及应用提供参考。

关键词: 钢骨混凝土柱 梁柱节点 低周反复加载试验 延性

Design and experimental study on joints of prestressed beam and steel reinforced concrete column of variable steel section of Theme Pavilion of the World Expo 2010.

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Abstract:

In order to investigate the failure modes and the mechanical behavior of joints of prestressed beam and steel reinforced concrete column of variable steel sections, four specimens were tested under reversed cyclic loading. The failure process and patterns were observed. The mechanical behavior such as the load-displacement hysteresis loops, skeleton curves, load carrying capacity, and ductility were analyzed. It is shown that the main failure patterns of the joints of prestressed beam and reinforced concrete column of variable steel section are shear-bending at the beam root. The ductility of such joint is similar to concrete joint, the ductility factor of displacement is 2.0. Steel member in column can increase load carrying capacity and stiffness. Ductility of joints would be improved by using steel column of variable sections, however it is not effective to increase load carrying capacity. Poor quality of concrete have great effect upon mechanical behavior of the joints. Suggestions for design and construction are also presented.

Keywords: steel reinforced concrete column beam-column joint reversed cyclic loading test ductility

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