

学术论文

钢筋混凝土柱-钢桁梁组合节点抗震性能试验研究

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摘要: 结合中国科学技术新馆工程对钢筋混凝土柱-钢桁梁组合节点进行抗震性能试验研究。根据两组四个试件的低周往复试验结果,对节点的强度、刚度、延性、耗能能力和变形性能进行综合评估,结果表明钢筋混凝土柱-钢桁梁组合节点具有良好的承载能力、延性、耗能能力和变形恢复能力,抗震性能优越。同时,还讨论了不同破坏模式对节点抗震性能的影响以及栓钉布置对钢骨和混凝土协同工作的影响,结果表明梁端弯曲破坏模式的抗震性能优于节点区剪切破坏模式,钢骨混凝土柱是否布置栓钉对钢骨和混凝土之间的协同工作影响不大。试验研究为中国科学技术新馆工程整体结构弹塑性时程分析提供依据,是结构整体抗震性能评估的重要基础,研究结论可为钢骨混凝土柱-钢桁梁组合节点在工程中的应用提供参考。

关键词: 钢筋混凝土柱 钢桁梁 组合节点 低周往复荷载试验 抗震性能

Experimental research on seismic behavior of steel reinforced concrete column-steel truss beam composite joints

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Abstract: An experimental research was conducted on seismic behavior of steel reinforced concrete column-steel truss beam composite joints,in order to support the design of the China Science & Technology Museum.Strength,stiffness,ductility,energy-consuming capacity and deformation property were comprehensively evaluated based on the results of reversed cyclic loading tests on four models divided into two groups.The satisfying seismic behavior of steel reinforced concrete column-steel truss beam composite joints was verified by the test results.Furthermore,the influence of different failure modes on the seismic behavior of the joints and the influence of stud layout on the deformation compatibility of steel and concrete were discussed respectively.It is found that flexural failure at the beam end results in superior seismic behavior than shear failure at the joint region does,and whether the studs are laid in the steel reinforced concrete column makes no difference on the compatibility of steel and concrete.Nonlinear time-history analysis and seismic behavior evaluation of the overall structural system of China Science & Technology Museum are based on the research work completed in this paper.Conclusions drawn in this paper are helpful for the application of steel reinforced concrete column-steel truss beam composite joints.

Keywords: steel truss beam composite joint low cyclic reversed load test seismic behavior

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