

学术论文

主管内填混凝土矩形和圆形钢管桁架受弯性能对比试验研究

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摘要: 为研究主管内填混凝土对矩形和圆形钢管桁架结构受弯性能的影响及两者区别,进行了矩形和圆形钢管桁架空管、仅受压主管内填混凝土和拉压主管均内填混凝土三种类型桁架的对比试验研究。试验结果表明:矩形截面桁架均发生节点失效,空管桁架为受压主管侧壁鼓曲破坏,仅受压主管内填混凝土和拉压主管均内填混凝土桁架发生受拉主管顶板的冲剪破坏;圆形截面空管桁架和仅受压主管内填混凝土桁架发生空管节点处的主管侧壁鼓曲破坏,拉压主管均内填混凝土桁架为受拉主管受拉断裂破坏。主管内填混凝土有助于提高主管轴向刚度,提高节点强度和刚度及整体承载力,节点承载力按规范计算结果偏于安全,桁架整体变形计算需考虑节点变形的影响。两种截面空管桁架的承载力及变形差异不明显,主管内填混凝土后,圆形截面桁架的整体和节点承载力比相应矩形截面桁架承载力要高,变形能力更好,且节点变形比例更小。

关键词: 桁架 矩形钢管 圆形钢管 填充混凝土 静力试验 受弯性能

Experimental research on RHS and CHS truss with concrete filled chord

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Abstract: The paper describes a study on the effect of concrete filled chord in rectangular hollow section(RHS) and circular hollow section(CHS) steel tube truss.Tests on trusses made with RHS and CHS steel tube with three types were carried out,with the first type specimens being RHS and CHS trusses,the second type specimens being RHS and CHS trusses with concrete filled in the compressive chord,and the third type specimens being RHS and CHS trusses with concrete filled in both the compressive and the tension chords.Test results indicated that all rectangular section truss specimens failed in the joints.The failure of RHS truss was due to the compressive chord plastification,the other two were due to the flange punching failure mode of tension chord wall which connected with the tension branch.The CHS truss and CHS truss with compressive chord concrete-inside failed due to the chord plastification,while the failure of the CHS truss with both chord concrete-inside was due to the tension brace broken.Concrete-filled in chord can not only help reinforcing steel tube,but also enhance the strength and rigidity of the joints,resulting in the increase of the ultimate bearing capacity of the whole trusses.The bearing capacity of test results is lager than the calculations according to corresponding specifications.The impact of the joints deformation should be taken into account when truss deformation is calculated,or the calculations results could be unsafe.RHS and CHS trusses have not much difference in the load bearing capacity and deformation,but with chord filled with concrete,the CHS trusses have the higher capacity of the overall truss and joints,better deformability than the corresponding RHS trusses.

Keywords: rectangular steel tube circular steel tube concrete-inside static test bending

收稿日期 2010-08-05 修回日期 2010-08-05 网络版发布日期 2010-08-05

DOI:

基金项目:

教育部新世纪优秀人才支持计划项目(NCET-06-0855);; 国家西部交通建设科技项目(2006318812112);; 交通部应用基础研究项目(2006319812130)

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