序。数值模拟显示,该方法对于监测钢筋混凝土梁中混凝土与钢筋界面的破坏是有效的。

关键词:钢筋混凝土;梁;结合面;损伤监测;逆问题;有限元;裂缝;静力;变形

光纤传感器在土木工程健康监测中的应用

Recent Applications of Fiber Optic Sensors to Health Monitoring in Civil Engineering

Hong-Nan Li, Dong-Sheng Li and Gang-Bing Song

Abstract: This paper presents an overview of current research and development in the field of structural health monitoring with civil engineering applications. Specifically, this paper reviews fiber optical sensor health monitoring in various key civil structures, including buildings, piles, bridges, pipelines, tunnels, and dams. Three commonly used fiber optic sensors (FOSs) are briefly described. Finally, existing problems and promising research efforts in packaging and implementing FOSs in civil structural health monitoring are discussed.

Keywords: Structural health monitoring; Fiber optic sensor; Civil health

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摘　要:总结了当前土木工程结构健康监测的研究和发展趋势。重点回顾了光纤传感器在各种主要土木结构中的健康监测,包括建筑物、桩、桥、管道、隧道和大坝。描述了光纤传感器的三种用途。最后,讨论了在土木结构健康监测中封装和实现光纤传感器存在的问题和有前途的研究方向。

关键词:结构健康监测;光纤传感器;土木工程

不同类型装配节点的钢梁与钢管混凝土柱结构抗火性能试验研究

Experimental Study of Structural Fire Behaviour of Steel Beam to Concrete Filled Tubular Column Assemblies with Different Types of Joints

J. Ding and Y. C. Wang

Abstract: This paper presents experimental results of structural fire behaviour of steel beam to concrete filled tubular (CFT) column assemblies using different types of joints.

The joint types include fin plate, end plate, reverse channel and T-stub. The structural assembly was in the form of a "rugby goalpost". In each test, loads were applied to the beam and then the structural assembly was exposed to the standard fire condition in a furnace while maintaining the applied loads. In total, 10 tests were carried out. In eight of the 10 tests, fire exposure continued until termination of the fire test, which was mainly caused by structural failure in the joints under tension when the beam was clearly in substantial catenary action. In the other two tests, fire exposure stopped and forced cooling started when the beam was near a state of pure bending and just about to enter into catenary action. The results of the experiments indicate that even the relatively simple joints used in this study were able to allow the beams to develop substantial catenary action so that the final failure times and beam temperatures of the assemblies were much higher than those obtained by assuming the beams in pure bending. At termination of the tests, the beams reached very high deflections (about span/5), even then failure of the assemblies always occurred in the joints. Therefore, to enable the beams to reach their full potential in catenary action, the joints should be made to be much stronger. The results also indicate that reverse channel connection has the potential to be developed into a robust connection characterized by high stiffness, strength, rotational capacity and ductility. The beams in the two cooling tests developed high tension forces, however there was no structural failure in the assemblies. The principal aim of this paper is to present experimental results of joint behaviour in fire (which until now is lacking) to enable development of better understanding and rational design methods for robust construction of joints to resist extreme fire attack.

Keywords: Joints; Concrete filled tubes; Catenary action; Fire resistance; Fire tests; Cooling behaviour

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摘　要:介绍了不同类型装配节点的钢梁与钢管混凝土柱结构的抗火性能的试验结果。节点类型包括翼板、端板、反向通道、T 型接头。结构装配按照"橄榄球门柱"形式。试验中将每个承受荷载的试件置于维持标准火强度状态下的炉子中。共完成了 10 个试验。10 个试验中的 8 个试件置于火中直至耐火试验结束。结构破坏主要在节点处,在拉力下梁出现明显的悬垂拱作用。另外两组试验,当梁接近