中南大学学报 自然科学版 英文版

教育部 主管
中南大学 主办

论文摘要

中南大学学报(自然科学版)

ZHONGNAN DAXUE XUEBAO(ZIRAN KEXUE BAN)

Vol.40 No.4 Aug.2009

[PDF全文下载] [全文在线阅读]

文章编号：1672-7207(2009)04-1079-07

自锚式悬索桥地震响应及减震控制分析

宋旭明，戴公连，曾庆元

(中南大学 土木建筑学院，湖南 长沙，410075)

摘 要：以长沙三汉矶湘江大桥为研究对象，对自锚式悬索桥的动力特性、地震响应及粘滞阻尼器的减震效果进行分析。基于结构非一致激励地震动方程，建立空间非线性有限元模型，探讨一致输入、行波输入下结构的地震响应。分别以主梁纵向位移、塔底内力为控制目标，研究粘滞阻尼器参数变化对结构减震效果的影响。计算结果表明：地震作用下塔底顺桥向弯矩达117.492 MN·m，对自锚式悬索桥的设计起控制作用；行波效应使得主梁跨中横向位移增大90%，横向弯矩减小60%；结构纵向位移及塔底内力在考虑行波效应后减小10%左右，安装参数合理的阻尼器使主梁纵向位移减小83%，塔底纵向弯矩减小62%，达到良好的减震效果。

关键字：自锚式悬索桥；地震响应；行波效应；粘滞阻尼器

Seismic response analysis and control of self-anchored suspension bridge

SONG Xu-ming, DAI Gong-lian, ZENG Qing-yuan

（School of Civil and Architectural Engineering, Central South University, Changsha 410075, China）

Abstract: Taking the project of Sanchaji Bridge as object, the dynamic characteristics and seismic response of self-anchored suspension bridge was calculated. The seismic response after installing viscous dampers was analyzed. Based on the equation of multi-support excitation, a spatial nonlinear finite element model was established and the seismic response of the bridge under synchronous excitation and traveling seismic excitation were discussed. In order to reduce the longitudinal displacement of the girder and the inner force of the pylon bottom, parameters of the viscous damper was studied. The results show that transverse displacements in mid-span increase by 90% and the transverse moment reduces by 60% under traveling seismic excitation. The longitudinal displacement and inner force of the pylon bottom reduces about 10% considering the effect of the traveling seismic excitation. The longitudinal displacement of the girder reduces by 83% and longitudinal moment of the pylon bottom reduces by 62% through installing viscous damper with appropriate parameters. The seismic response can be controlled effectively.

Key words:self-anchored suspension bridge; seismic response; traveling seismic excitation; viscous damper

地 址：湖南省长沙市中南大学　　邮编： 410083
电 话： 0731-88879765 传真： 0731-88877727
电子邮箱： zngdxb@mail.csu.edu.cn 湘ICP备09001153号