

学术论文

非对称刚性连体超高层结构弹塑性时程分析

吴晓涵<sup>1</sup>, 刘东泽<sup>1</sup>, 芮明倬<sup>2</sup>, 严敏<sup>2</sup>, 李立树<sup>2</sup>

1.同济大学 土木工程学院, 上海 200092; 2.华东建筑设计研究院有限公司, 上海 200002

摘要:

某超高层建筑造型和结构体系独特, 其结构为刚度和质量均不对称的超高层双塔连体体系。由于南北两座塔楼的刚度存在差异, 结构的扭转反应明显。采用NosaCAD有限元软件建立整体结构分析模型, 分析结构在7度多遇和罕遇地震下的弹塑性时程反应, 得到结构在地震作用下的变形、内力和破坏情况的变化过程。结果表明: 7度多遇地震作用下, 结构构件未出现损坏; 罕遇地震作用下, 结构最大层间位移角满足1/100的限值要求, 结构框架梁柱未出现破坏, 筒体构件破坏顺序和分布较为合理, 能在一定程度上耗散地震输入能量, 结构可以满足“小震不坏, 大震不倒”的设防要求; 根据构件的受力及破坏情况, 建议加强底部和加强层核心筒的配筋。图13表7参9

关键词: 复杂高层 双塔连体结构 弹塑性时程分析 抗震性能

Elasto-plastic time history analysis of asymmetrical rigid-connected twin-tower structure

WU Xiaohan<sup>1</sup>, LIU Dongze<sup>1</sup>, RUI Mingzhuo<sup>2</sup>, YAN Min<sup>2</sup>, LI Lishu<sup>2</sup>

1.College of Civil Engineering, Tongji University, Shanghai 200092, China; 2.East China Architectural Design & Research Institute Co., Ltd, Shanghai 200002, China

Abstract:

The peculiar building style and special structural system of the structure analyzed in this paper is rigid-connected twin-tower skyscraper with asymmetrical distribution of stiffness and masses in two towers. Because of the different stiffness between the north and the south towers, the torsional seismic vibration is obvious. In this paper, in order to study the seismic behavior of the structure under the frequent and rare intensity of 7 degree earthquake, the structural analysis model is established with NosaCAD. Based on the analysis, the deformations, internal forces and damage patterns of the structure are investigated. The results of the study show that, under frequent earthquakes, there is no damaged element. Under rare earthquakes the maximum inter-story drifts are less than the seismic design requirement of the Chinese code. There are no damages on the columns and beams of the frame. The sequence and distribution of damages on components of the tubes are reasonable, which can dissipate some dynamic energy. The structure can meet the code requirements of no damage under frequent earthquakes and no collapse under rare earthquakes. Finally, according to internal forces and load-carrying capacity and damage state of element, the suggestion of increasing the reinforcement in the core tube at base and strengthened stories is given. 9Refs.In Chinese.

Keywords: complex high-rise building multi-tower structure elasto-plastic time history analysis seismic behavior

收稿日期 修回日期 网络版发布日期

DOI:

基金项目:

通讯作者: 吴晓涵(1964—), 男, 浙江杭州人, 工学博士, 副教授

作者简介:

作者Email: xhwu@tongji.edu.cn

参考文献:

本刊中的类似文章

1. 王燕;高鹏;郁有升;王玉田;.钢框架梁端翼缘扩大型节点低周反复荷载试验研究[J]. 建筑结构学报, 2010,31

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(1003KB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 复杂高层
- ▶ 双塔连体结构
- ▶ 弹塑性时程分析
- ▶ 抗震性能

本文作者相关文章

PubMed

(04): 94-101

2. 郭子雄;林煌;刘阳;.不同配箍形式型钢混凝土柱抗震性能试验研究[J]. 建筑结构学报, 2010,31(04): 110-115
3. 陈星;张松;区彤;李松柏;傅剑波;李穗生;.广州亚运城历史展览馆结构设计[J]. 建筑结构学报, 2010,31(03): 114-122
4. 樊健生;陶慕轩;聂建国;李婷;赵楠;. 钢骨混凝土柱-钢桁梁组合节点抗震性能试验研究[J]. 建筑结构学报, 2010,31(02): 1-10
5. 张爱林;于劲;徐敏;刘显旺;刘会军;.低周反复荷载作用下十字形截面钢异形柱抗震性能试验研究[J]. 建筑结构学报, 2010,31(02): 11-19
6. 张爱林;于劲;徐敏;李健;刘会军;.低周反复荷载作用下T形截面钢异形柱抗震性能试验研究[J]. 建筑结构学报, 2010,31(02): 20-28
7. 石永久;熊俊;王元清;刘歌青;.多层钢框架偏心支撑的抗震性能试验研究[J]. 建筑结构学报, 2010,31(02): 29-34
8. 隋葵;赵鸿铁;薛建阳;张锡成;刘义;.古代殿堂式木结构建筑模型振动台试验研究[J]. 建筑结构学报, 2010,31(02): 35-40
9. 曹万林;张建伟;孙天兵;董宏英;.双向单排配筋高剪力墙抗震试验及计算分析[J]. 建筑结构学报, 2010,31(01): 16-22
10. 陈学伟;韩小雷;林生逸;吴培烽;何伟球;.中洲中心二期结构抗震性能分析[J]. 建筑结构学报, 2010,31(01): 101-109
11. 张富林;周健;项玉珍;张耀康;王冬;.上海陆家嘴金融贸易区X2地块南北塔楼结构设计与研究[J]. 建筑结构学报, 2009,30(S1): 14-20
12. 盛平;徐福江;柯长华;.海控国际广场续建超高层结构设计[J]. 建筑结构学报, 2009,30(S1): 41-45
13. 葛家琪;韩志宏;张国军;王明珠;张庆亮;.成都传媒中心大厦结构方案选型与抗震性能分析[J]. 建筑结构学报, 2009,30(S1): 77-86
14. 王启文;吕志军;雷婷;.深圳迈瑞大厦超限结构抗震设计[J]. 建筑结构学报, 2009,30(S1): 87-93
15. 孙国红;陆道渊;于海博;.大连小平岛假日公寓超高层住宅抗震设计[J]. 建筑结构学报, 2009,30(S1): 94-98+128