

[1]易伟建,马会杰.近场地震下已建钢筋混凝土框架结构抗震性能分析[J].自然灾害学报,2010,06:112-118.

YI Wei-jian,MA Hui-jie.Seismic analysis of existing RC frame structures under near-field ground motions[J].,2010,06:112-118.

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近场地震下已建钢筋混凝土框架结构抗震性能分析

《自然灾害学报》[ISSN:/CN:23-1324/X] 期数: 2010年06期 页码: 112-118 栏目: 出版日期: 2010-08-09

Title: Seismic analysis of existing RC frame structures under near-field ground motions

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关键词: [已建结构](#); [抗震规范](#); [近场地震](#); [钢筋混凝土框架结构](#); [静力弹塑性分析](#)

Keywords: [existing structures](#); [seismic design codes](#); [near-field earthquake](#); [RC frame structures](#); [pushover analysis](#)

分类号: P315.69

DOI: -

文献标识码: -

摘要: 选取前方向效应近场地震波、滑冲效应近场地震波和远场地震波,对按《工业与民用建筑抗震设计规范》(TJ11-78)设计的4层钢筋混凝土框架结构进行了弹塑性时程分析。结果表明:前方向效应近场地震动和滑冲效应近场地震动对结构反应有很强的放大作用,当结构为弹性时对基底剪力影响较大,进入塑性后,对位移的影响更显著。综合弹塑性时程分析和Pushover分析两种方法对结构的抗震性能进行了评估,发现结构在小震下的整体变形超出了我国现有规范的限值,而在大震时发生了倒塌,从而从计算的角度解释了汶川地震中那部分20世纪80年代建造的结构倒塌的原因。

Abstract: With the method of nonlinear time history analysis, the behaviors of a four-story reinforced concrete frame designed according to TJ11-78 edition seismic code for industrial and civil buildings was studied under the action of near-field ground motions with forward directivity and fling-step and far-field ground motions. The results indicate that the seismic responses are magnified much when the structure is subjected to near-field ground motions with forward directivity and fling-step. When the structure is elastic, the amplification effect on base shear is remarkable, after the structure enters inelastic stage, the amplification effect on displacement becomes larger than that of base shear. The methods of nonlinear time history analysis and pushover analysis were applied to estimate the seismic performance of the structure. It is found that the global deformation of the structure exceeds the limited value from edition of 2001 of seismic code for buildings and collapses under rare strong earthquake. This work explains the phenomena quantitatively that most structures designed in 1980's collapsed

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备注/Memo: 收稿日期:2009-6-15;改回日期:2010-5-21。

基金项目:国家自然科学基金资助项目(90815002)

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更新日期/Last Update: 1900-01-01