

学术论文

带叠层桁架转换层高层建筑结构整体模型振动台试验研究

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摘要:

上海裕年国际商务大厦为带巨型叠层桁架转换层的高层建筑结构,属于复杂高层建筑结构。预应力混凝土叠层转换桁架的跨度和其所承受的竖向荷载均很大,是整个结构设计和施工的技术关键。为了研究该结构的整体抗震性能,进行了一个1:25 缩尺模型的振动台试验,研究了模型结构的动力特性,以El Centro波、Pasadena波和Shw2002波为输入地震波,分别按设防烈度7度多遇、基本、罕遇、超罕遇以及8度罕遇、超罕遇地震作用进行试验,研究了模型结构在各阶段地震作用下的加速度、位移和应变反应,以及结构的破坏形式和破坏机理。试验结果表明,模型结构能满足7度抗震设防的“小震不坏”和“大震不倒”的设计要求,8度超罕遇地震作用下结构仍不倒塌,结构具有良好的抗震性能。在7度多遇、基本以及罕遇地震作用下,预应力混凝土叠层转换桁架基本处于弹性状态。图15表4参7

关键词: 高层建筑 叠层桁架 转换层 振动台试验 抗震性能

Shaking table test of structural model of high rise building with laminated truss transfer story

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Abstract:

Yunian International Commercial Affairs Building is a complex high rise building with mega-laminated truss transfer story. The prestressed concrete laminated truss transfer story with very large span and high vertical load demand is the key technological challenge for the entire structural design and construction. To investigate its seismic performance, a 1:25 reduced scale structure model of Yunian International Commercial Affairs Building was tested on shaking table. The dynamic properties of the model structure were studied. The test was conducted, inputting the El Centro earthquake wave, the Pasadena earthquake wave and the Shw2002 earthquake wave in four intensities, i.e. the frequent intensity, the fortification intensity, seismic rare intensity and the strong and rare intensity for seismic regions of 7 and 8 degree respectively. The model responses of acceleration, displacement and strain were measured under different earthquake waves. The failure mechanism and the cracking pattern were discussed as well. The experimental results show that the model structure can meet the design requirements for seismic regions of intensity 7, i.e. no damage under frequent earthquakes and no collapse under rare earthquakes. Collapse of the structure can be prevented for rare intensity for 8 degree. Thus the structure has adequate seismic performance. The prestressed concrete laminated transfer truss is basically in elastic range under the earthquake action of the frequent intensity, the fortification intensity and the rare intensity 7. 7Refs. In Chinese.

Keywords: high-rise building laminated truss transfer story shaking table test seismic behavior

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扩展功能

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