

学术论文

钢板剪力墙的试验研究

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摘要:

天津津塔是我国首座采用钢板剪力墙的超高层建筑,也是目前已知规模最大的钢板剪力墙结构,其主要抗侧力体系为钢板剪力墙和钢管混凝土柱所构成的核心筒。为研究这种结构体系及其构造做法的实际受力性能,并为设计计算提供试验依据,完成了2个2跨5层1:5缩尺比例的钢板剪力墙模型的低周往复加载试验。试件变化的主要参数包括钢板剪力墙与周边框架的连接方式以及钢板剪力墙的加劲构造措施。试验表明,钢板剪力墙结构具有较高的承载能力,稳定的滞回性能。未设置加劲肋的钢板剪力墙试件,在加载初期即发生平面外屈曲,其滞回曲线呈现一定的S形捏拢趋势;设置有4道竖向加劲肋的钢板剪力墙试件,在加载过程中未发生平面外屈曲,其滞回曲线呈饱满的纺锤形。此外,采用摩擦型高强螺栓连接的钢板剪力墙试件在加载过程中有较大噪声,可能影响结构的正常使用。

关键词: 钢板剪力墙 加劲肋 钢管混凝土柱 拟静力试验 滞回性能

Experimental research on steel plate shear wall

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Abstract:

Tianjin Jinta Tower is the first high Civil Construction Structures. rise building built with steel plate shear wall in China. The main lateral force resisting systems is the composite core tube composed of steel plate shear walls and concrete filled steel tubular columns. In order to study the mechanical behavior of this structural system and to provide design validation, two model specimens of 2-bay and 5-storey steel plate shear wall with 1:5 scale were tested under low -cycle reverse loading. The steel shear plate of the first specimen was connected with the frame by bolts, and the plate was not stiffened. The steel plate shear wall of the second specimen was connected with the frame by welding, and the steel plate was stiffened by channels. The test results show that the steel plate shear wall has higher loading capacity, full hysteresis loops and stable energy dissipation. But for steel plate shear wall without stiffening, local buckling will occur at the early stage of loading, and the pinching of hysteresis loops can be observed with S shape. For steel plate shear wall with stiffening, no buckling is observed during the loading process, and plump hysteresis loops are obtained. The specimen connected with high strength bolts emit noise for the slip of friction surface during loading, which maybe of concern for serviceability condition.

Keywords: steel plate shear wall stiffener concrete filled tubular columns low -cycle reverse loading test hysteretic behavior

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