Seismic Response Research of Inter-story Isolation System

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Abstract: The basic principle of inter-isolated structure is expounded, the application of the inter-isolated structure is analyzes home and abroad, research ideas and progress in recent years of are summarized in detail, and the earthquake disasters research focus of the structure is put forward. The study shows that the inter-isolated structure is an advantageous structure, and its special dynamic characteristics and damping mechanism are gradually being studied and have good application prospects. This paper can be used as reference for scientific research and engineering personnel.

The interlayer seismic structure is to set the isolation layer to the top of a structure or shear wall to control the seismic response of the structure . According to the different location of the isolation layer, the interval vibration has many forms, as shown in figure 1. As the isolation layer position down, interval shock system damping mechanism by TMD tuning gradually transition to the energy dissipation of seismic isolation, on the structure dynamic characteristics are embodied in the proportion of modal mass participation factor change .

The seismic structure of the laminates differs from the base isolation structure in terms of the mechanism, vibration characteristics and design methods. Compared with the base isolation, the interval shock has the following advantages:

(1) base isolation structure, on the top of the isolation layer need to add a layer thickness is greater than 160 mm beam slab floor, while layer interval shock does not need to add the floor, just the structure of the original floor according to the requirement of vibration isolation design;

The periphery of the basic isolation structure must be reserved enough space to ensure that the seismic time isolation layer can play a role; However, the structure of the interlayer seismic structure does not need to reserve space for the large displacement of the isolation layer during the

earthquake, nor does it need to set up the corresponding structural measures corresponding to the reserved space.

(3) of offshore structures, existing buildings, vertical irregular, large span even existent conjoined structure, terrain slope, such as construction sites, due to various limitations, base isolation can not be implemented, the shock layer spacing can breakthrough the limitation of conditions, give play to the role of shock absorption;

The house with isolation technology is used, and the water heating pipe through the seismic layer should be installed as a hose. When the isolation layer is set between layers, the hose section can be set above the ground to facilitate the construction, maintenance and replacement of the hose section. In the case of earthquake reinforcement for old houses, if the base isolation form is adopted, the original structure should be disconnected from the top of the base, and the construction is more complicated. At the top of the original structure, the insulation layer will be installed, and the construction process will be much more convenient.

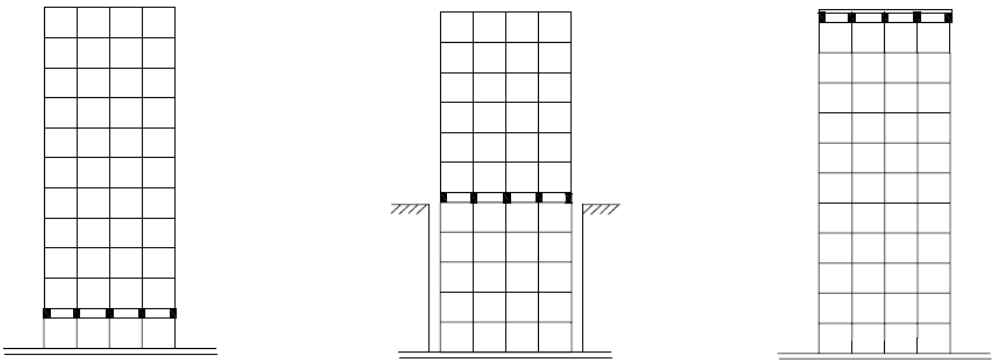

Fig.1 Isolation layer between the different structures

Fig.2 Japan research center

Fig.3 A building inYokohama, Japan

In Japan, there are many applications of interlayer seismic structure . There are more than 60 buildings in Japan, of which 18 are over 60m, and the highest level is over 130m. 78% of them are reinforced concrete structures, but 8% of the buildings have different structural forms of upper and lower structures. As shown in figure 2, figure 3, figure 2 layer spacing for the Japanese research center building, located in Japan's shizuoka prefecture atami springs, 16th floor on the ground, 1 floor underground, isolation layer is located in the top layer, 8 SRC frame shear structure, completed in 1996 . FIG. 3 is a seismic building in yokohama, Japan. The isolation layer is located at the 7th floor and SRC frame shear structure, which was completed in 2007.

Fig.4 Suqian soho ginza

Fig.5 Department of civil building, national Taiwan university

There are also application examples of interval seismic building in China, as shown in fig.4-7. Figure 4 is suhao ginza, suhao city, suqian city, which is composed of 2-floor basement, four-layer commercial skirt room and two 16-storey towers perched on top of the dress room. It is 73.7m high and has a total construction area of 67027m2. The isolation layer is set between the four-layer skirt house and the bottom layer of the tower, and the isolation layer is 1.8m high. The isolation layer has a diameter of 900-1300mm rubber vibration isolation mount 69, nonlinear viscous damper 16.

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