Experimental study on mechanical properties of three-dimensional composite uplift isolation bearing

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Abstract

The long-span spatial structure is flexible, and the damping ratio of the structure is relatively strong under horizontal and vertical earthquakes, and the uplift force exists at the support. To this end, this paper proposes a three-dimensional composite anti-extraction isolation bearing suitable for large-span spatial structures.The seismic isolation support is composed of a high damping rubber bearing and an upper disc spring device in series. The horizontal and vertical mechanical properties of the test were studied. In the horizontal direction, the test focuses on the hysteretic behavior of the bearing under simple harmonic excitation, and investigates the influence of shear strain and loading frequency on its horizontal mechanical properties. In the vertical direction, the equivalent stiffness and equivalent damping ratio of the bearing. Experimental research was carried out to investigate the effects of different loading amplitudes and different loading frequencies on their vertical hysteresis performance. The results show that the composite isolation bearing has good hysteresis performance in both horizontal and vertical directions. The horizontal equivalent damping ratio is between 0.129 to 0.153, which decreases with the increase of shear strain, it increases with the loading frequency; the vertical equivalent damping ratio is between 0.094 to 0.178, vertical loading frequency has little effect on it.

Figure 1 Experimental Model of isolation bearing

References

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