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Response of Base Isolation System for Small Exhibits in the Museum

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Extended Abstract

Small exhibits displayed in the museum had been overturned and damaged by big seismic ground motion [1], [2]. In order to reduce the risk of seismic damage, some small base isolation systems for small exhibits, that are possible to install inside buildings, have been developed [3]-[5]. However, their mechanisms have been complicated and cost too much, the system is not popular in the small-scale museums. Therefore, we have proposed a simple seismic isolation system for exhibits in the museums [6]. In order to investigate effectiveness of the system, dynamic characteristics of the system are investigated by vibration experiment.

The simple isolation system consists of two aluminium metal plates coated with solid lubricant. A large lower plate is 500×500 mm size, a small upper one is 125×125 mm size. A friction coefficient between two plates is 0.12. Since mechanisms of the system are quite simple, it is easy to maintain it.

To confirm effectiveness of the system, the excitation experiment was performed using a seismic ground motion of Mid Niigata Prefecture Earthquake in 2004 recorded at K-NET NII019 (K-NET Ojiya) as the input wave. The peak acceleration amplitude on the input wave indicated 1313 Gal, the peak response amplitude on the system was 221 Gal. Since it has reduced to about 1/6 against the peak acceleration amplitude on the input wave, the system is effective to reduce the response on seismic ground motion. Next, the effectiveness of overturning prevention for small exhibits was investigated by excitation experiment. In the experiment, a vase that overturing acceleration amplitude is 400 Gal, was installed on the upper plate of system. The response waveform on the upper plate was enough reduced. Although a part of the response waveform on the top of the vase identifies such as pulse, it indicates that the vase generated rocking motion. And the vase did not overturn. In fact, the peak response acceleration amplitude on the upper plate is 221 Gal, is lower the overturning acceleration of the vase.

The system is effective to prevent overturning of small exhibits in the museums by seismic ground motion.

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