

Development of a New Seismic Control Technology

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Many methods have been so far developed for the seismic and/or vibration control of structures and equipment. However, none of them has been able to completely eliminate the vibration. The existing control methods can just reduce the output responses to some degree and some amounts of the input excitation is always passed through the control device to the structure under control. This paper proposes a new vibration control system that can eliminate the input excitations without any notable transfer of vibration from the source to the structural body under control.

The proposed control device is composed of two main parts; a spring-damper part and a hydraulic system part. The spring-damper part is a single-degree-of-freedom oscillator. It has a rotary hand that provides the required displacement for the hydraulic part. Meanwhile it transfers the weight under control to the ground/base. The hydraulic system, on the other hand, provides a media that the axial loads can be easily transferred through it to the spring-damper part. It also neutralizes the residual responses coming out from the first stage of isolation, to be the spring-damper part, by its special shape. This device can be utilized in different arrangements in order to provide both vertical and/or horizontal control possibilities.

The efficiency of the system in minimizing the dynamic responses, and also its advantage over the conventional seismic control techniques have been concluded through its particular mechanism. The proposed system can be utilized for structural bodies such as buildings or bridges, as well as for equipment vibration or vehicle suspension control and so on. This device can also be used for both new and existing systems to improve their seismic performance drastically.

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