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Evaluation of High Damping Rubber Considering Initial History through Dynamic Loading Test and Program Analysis

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Abstract : High damping rubber (HDR) bearings are dissipating devices mainly used in seismic isolation systems and have a great damping performance. Although many studies have been conducted on the dynamic model of HDR bearings, few models can reflect phenomena such as dependency of experienced shear strain on initial history. In order to develop a model that can represent the dependency of experienced shear strain of HDR by Mullins effect, dynamic loading test was conducted using HDR specimen. The reaction of HDR was measured by applying a horizontal vibration using a hybrid actuator under a constant vertical load. Dynamic program analysis was also performed after dynamic loading test. The dynamic model applied in program analysis is a bilinear type double-target model. This model is modified from typical bilinear model. This model can express the nonlinear characteristics related to the initial history of HDR bearings. Based on the dynamic loading test and program analysis results, equivalent stiffness and equivalent damping ratio were calculated to evaluate the mechanical properties of HDR and the feasibility of the bilinear type double-target model was examined.

Keywords : base-isolation, bilinear model, high damping rubber, loading test
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