A CASE STUDY ON THE EVALUATION OF THE SEISMIC RESPONSE OF A REINFORCED CONCRETE HIGHWAY BRIDGE INCORPORATING LINEAR AND NONLINEAR VISCOUS DAMPERS

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Abstract

Maintaining the safety and functionality of bridges is of utmost importance, especially in the event of an earthquake, when immediate seismic retrofitting may be necessary. In such cases, a combination of isolation systems and viscous dampers can offer an effective solution. A study was conducted to assess the seismic performance of an RC bridge equipped with linear and nonlinear viscous dampers at both pier tops and abutments. The bridge is modelled in SAP2000 software. The bridge model incorporated elastomer bearings (EBs) and viscous dampers (VDs) at the abutments and the tops of the piers, which are the connection points to the bridge deck. The findings indicated a significant reduction in the maximum bending moment of two piers compared to the scenario where the pier tops are fixed to the deck. However, it was observed that excessively high viscous damper coefficients could potentially lead to structural damage to the bridge deck in the event of a strong design earthquake. Hence, the study underscores the necessity for future research to determine the optimal bearing stiffness and damping coefficient for viscous dampers in RC bridges.

Keywords: Highway bridge, Elastomer bearing, Viscous dampers, Earthquake ground motion, Vibration control of bridge