NUMERICAL SIMULATION OF BRIDGES WITH INCLINED DECK UNDER STRONG GROUND MOTION

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ABSTRACT

Pounding between decks was observed on most of the bridges which suffered severe damage even unseating. Although the pounding effect of seismically-excited bridges has been studied by many researchers, only few researchers investigated the bridges with inclined decks on this effect. However, the decks of bridges should be of slopes due to various terrain, route alignment and elevation. Occasionally the slope is up to 10%. Therefore, this research is aimed to study the pounding effect of bridges with inclined decks under strong ground motions. The Vector Form Intrinsic Finite Element (VFIFE) is superior in managing the engineering problems with material nonlinearity, discontinuity, large deformation, large displacement and arbitrary rigid body motions of deformable bodies. In this study, the Vector Form Intrinsic Finite
Element (VFIFE) is thus selected to be the analysis method. Two types of bridges, a six-span simply-supported bridge and a continuous bridge are analyzed. Both of bridges are with high damping rubber bearings. This study used different number of element to simulate the decks and the deck slopes are from 0% to 10%. The ground motion scales are from 100% to 300%. From the numerical analysis result, the deck deformations and forces without pounding effect are larger than the cases with pounding effect. And more element number is better to simulate the decks. The deck slope does not influence the number of unseating decks and damage bearings. The dynamic behavior of continuous elevated bridge is better than simply-supported elevated bridge under strong ground motion.

**Keywords:** pounding, elevated bridge, vector form intrinsic finite element, high damping rubber bearings.