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Influence of Biaxial Interaction in Bouc-Wen Hysteresis Model used for Modeling High Damping Rubber Bearing under Bi-Directional Excitation

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Abstract

The uniaxial Bouc-Wen hysteresis model is well established for simulating the bearing behavior in unidirectional excitations. However, the real scenario is quite different as seismic control devices like high damping rubber bearing exhibits the influence of the orthogonal excitations. In the current work, the feasibility of modelling the high damping rubber bearing (HDRB) using biaxial Bouc-Wen model is established. Further, the comparison of uniaxial Bouc-Wen and biaxial Bouc-Wen model is made for HDRB through responses and the correlation coef-ficients. The effect of bi-directional coupling compared with the uniaxial model is investigated for ten real earthquake input excitations. Further, the results validate the suitability of the biaxial Bouc-Wen model for simulating the interaction effects among HDRB. The changes in the correlation coefficients are significant when interaction is considered. Moreover, it was found that there is under estimation of peak displacement if interaction effects are ignored.

Keywords: Bouc Wen model, Biaxial Bouc Wen model, High damping rubber bearing, Interaction effects