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Accelerograms for time-history analysis of highway bridges in eastern Canada

Since the real records from strong earthquakes are not available for almost all parts of Canada, they are often selected from other countries having similar characteristics of ground motions. For example, for the time-history analysis of structures in western Canada (e.g. Vancouver) records are normally selected from earthquakes in California through PEER (Pacific Earthquake Engineering Research Center) database. However, eastern Canada researchers and practitioners always have difficulties in choosing accelerograms for the seismic analysis. Given this, the objective of this study is to compare the bridge responses based on different types of the spectrum-compatible ground motions and to make a recommendation on the use of the accelerograms for the nonlinear time history analysis of bridges in eastern Canada. For this purpose, two existing reinforced concrete bridges located in Montreal, which is considered as a moderate seismic hazard zone, are selected for the study. The spectrum-compatible accelerograms are generated by four different methods. Based on these methods, four sets of accelerograms compatible with the design spectrum for Montreal are selected for the analysis, namely, Set 1: scaled real accelerograms, Set 2: modified real accelerograms, Set 3: simulated accelerograms, and Set 4: artificial accelerograms. Nonlinear time-history analyses are conducted by subjecting the two bridge models to the three levels of the seismic excitations represented by each set of the accelerograms. The deck displacement, expansion bearing displacement, column curvature ductility, and base shear are used to investigate the effects of the selected sets of the accelerograms on the bridge response. Simulated accelerograms are recommended to conduct a time-history analysis of bridges in eastern Canada.

Biography

Lan Lin's research is in the fields of structural and earthquake engineering and focuses on the improvement of the seismic design and performance of buildings, bridges and infrastructure systems. In addition to her research expertise, she has extensive practical experience in the design of bridges. She is a licensed engineer registered in the province of Ontario, Canada. She has received two teaching excellence award from Concordia University.

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