Surrogate model-based seismic risk assessment of bridge transportation networks

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ABSTRACT

Conventional seismic risk assessment based on Monte Carlo simulation (MCS) may require a significant amount of computation time when dealing with a complex network (Tak *et al.* 2019). In this study, a surrogate model constructed using an artificial neural network (ANN) technique is introduced to accelerate the seismic risk assessment of a bridge transportation network. For surrogate model construction, the damage states of bridges are utilized as input data, and total system travel time (TSTT), which is recognized as a robust performance measure for transportation networks, is introduced and utilized as output data. To demonstrate the proposed methodology, an actual bridge transportation network in South Korea is adopted, and the network map is constructed based on GIS information. The corresponding analysis results show that the proposed methodology not only estimates the network performance accurately, but also provides a computationally-efficient procedure for probabilistic seismic hazard analysis.

REFERENCES

Tak, H.-Y., Suh, W. and Lee, Y.-J. (2019), "System-level seismic risk assessment of bridge transportation networks employing probabilistic seismic hazard analysis", *Math. Probl. Eng.,* **2019**, 6503616.

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