Analysis of Moving Loads on Bridges Using Surrogate Models

Authors : Susmita Panda, Arnab Banerjee, Ajinkya Baxy, Bappaditya Manna

Abstract : The design of short to medium-span high-speed bridges in critical locations is an essential aspect of vehicle-bridge interaction. Due to dynamic interaction between moving load and bridge, mathematical models or finite element modeling computations become time-consuming. Thus, to reduce the computational effort, a universal approximator using an artificial neural network (ANN) has been used to evaluate the dynamic response of the bridge. The data set generation and training of surrogate models have been conducted over the results obtained from mathematical modeling. Further, the robustness of the surrogate model has been investigated, which showed an error percentage of less than 10% with conventional methods. Additionally, the dependency of the dynamic response of the bridge on various load and bridge parameters has been highlighted through a parametric study.

Keywords : artificial neural network, mode superposition method, moving load analysis, surrogate models

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