



The dominant mode shapes of the viaduct-like structures subjected to the passage of high-speed train

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ABSTRACT

In this study, the mode shapes dominate the dynamic response of a viaduct under the passage of the high-speed train. The viaduct is modelled as a multi-bay frame and the train is modelled as a two-axle multi-body system with 4 DOF. The finite element method with Lagrange's equation has been used to determine the equations of in-plane motions, based on the Bernoulli-Euler beam theory. The Wilson-theta time integration scheme is employed to determine the dynamic response of the structure. To determine which modes are dominate the dynamic response, 3D frequency-velocity-amplitude graph is plotted.

Keywords: viaduct; mode shape; the finite element method; the Wilson-theta method; moving train