

# VERTICAL DYNAMIC INTERACTION OF TRAINS AND RAIL STEEL BRIDGES

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**ABSTRACT:** Rail steel bridges are vulnerable to high impact forces due to the passage of trains; unfortunately the determination of these transient impact forces is not straightforward as these are affected by a large number of parameters, including the wagon design, the wheel-rail contact and the design parameters of the bridge deck and track, as well as the operational parameters – wheel load and speed. To determine these impact forces, a detailed rail train-track/bridge dynamic interaction model has been developed, which includes a comprehensive train model using multi-body dynamics approach and a flexible track/bridge model using Euler–Bernoulli beam theory. Single and multi-span bridges have been modelled to examine their dynamic characteristics. From the single span bridge, the train critical speed is determined; the minimum distance of two peak loadings is found to affect the train critical speed. The impact factor and the dynamic characteristics are discussed.

*Keywords: train-track/bridge interaction, train critical speed, impact factor, and dynamic factor*