

**A Method for Estimating Bridge Girder Deflections Under Resonant Condition
Based on Drive-by Measured Track Geometries**

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In some high-speed railways, considerable cost and labor are invested in-situ bridge deflection measurements to appropriately manage resonant bridges during train passage. In this study, we propose a method for estimating girder deflection of resonant railway bridges using drive-by measured track geometries. Analyzing the dynamic response of resonant bridges could show that the deflection is estimated from three peak values in the difference of track geometries between the first and last cars. Numerical simulations and field verification on a high-speed railway showed that the proposed method can accurately estimate maximum girder deflection, with an error margin of less than 0.5 mm.