RECENT ADVANCES IN THE UNDERSTANDING OF BRIDGE DYNAMIC BEHAVIOUR ON THE WEST COAST MAIN LINE ROUTE MODERNISATION PROJECT

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ABSTRACT

The European operation of new generation trains with equally distributed powered axles throughout the train has identified the potential for excessive vibration/resonance within bridge structures, leading to the potential for serious effects on structures and/or trackform, (i.e.) overstressing of structural elements and/or ballast instability. With this knowledge in mind, Network Rail commissioned a series of studies to investigate the likely magnitude and consequences of such a phenomenon, as part of the West Coast Main Line Upgrade. The initial phase of the project confirmed there was a potential problem and more importantly that there was a lack of knowledge regarding the behaviour of the dynamic system (bridge/trackform/vehicle) and the consequences of increased vibration for typical UK bridge stock. The project has included shake table testing, site monitoring of some 150 structures under current rail traffic conditions to fully capture the dynamic responses and bridge specific analyses for in excess of 450 structures, complemented by a risk based assessment of a further 2000 structures, all with a view to achieving route clearance.