

Influence of Infinite Elements in Vibration Analysis of High-Speed Railway Track

Authors : Janaki Rama Raju Patchamatla, Emani Pavan Kumar

Abstract : The idea of increasing the existing train speeds and introduction of the high-speed trains in India as a part of Vision-2020 is really challenging from both economic viability and technical feasibility. More than economic viability, technical feasibility has to be thoroughly checked for safe operation and execution. Trains moving at high speeds need a well-established firm and safe track thoroughly tested against vibration effects. With increased speeds of trains, the track structure and layered soil-structure interaction have to be critically assessed for vibration and displacements. Physical establishment of track, testing and experimentation is a costly and time taking process. Software-based modelling and simulation give relatively reliable, cost-effective means of testing effects of critical parameters like sleeper design and density, properties of track and sub-grade, etc. The present paper reports the applicability of infinite elements in reducing the unrealistic stress-wave reflections from so-called soil-structure interface. The influence of the infinite elements is quantified in terms of the displacement time histories of adjoining soil and the deformation pattern in general. In addition, the railhead response histories at various locations show that the numerical model is realistic without any aberrations at the boundaries. The numerical model is quite promising in its ability to simulate the critical parameters of track design.

Keywords : high speed railway track, finite element method, Infinite elements, vibration analysis, soil-structure interface

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