Influences of car body flexibility on dynamic behavior of passenger railway vehicles passing over bridge

Abstract:

The effect of car body flexibility on ride comfort of train passing over bridge is studied in this project. In addition, the influence of different parameters such as stiffness and damping of the suspension system, track irregularity, rail joint, wheel flat and speed on carbody and bridge response and comfort indicators, namely Sperling's comfort index are investigated.
Euler-Bernoulli beam theory is used for modeling simple girder bridge. Flexible carbody is modelled as a simple uniform Euler–Bernoulli beam supported on secondary suspensions. Both suspensions are modeled by linear spring and dashpot. Arandomly irregular vertical track profile is modelled, characterized by its power spectral density (PSD). The 'roughness' is generated for three classes of tracks. The relative displacement excitations generated by wheel flat and rail joint are calculated by some analytical equations.

Keywords: Flexible Carbody, Bridge, Ride comfort, Track irregularity, Wheel flat, Rail joint, Mode summation