Dynamic Simulations of Railway Vehicles Running on Tracks with Lateral and Roll Vibrations

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In this study, the effects of the roll vibration of the track on the running safety of railway vehicles are investigated. During earthquakes, the top of the viaducts vibrate in roll direction in addition to lateral and vertical directions. The vehicle dynamics simulator (VDS) is modified so as to enable us to input the roll vibration into the track. According to the sinusoidal oscillation analysis, it is shown that the running safety of railway vehicles is decreased by approximately 10% when the ratio between the roll amplitude and the lateral amplitude of the track vibration is 0.02 rad/m. In addition, it is verified that the decrease of the running safety due to the roll vibration of the track in case of the rigid-frame structure is smaller than that in case of the pier structure. This is because the roll vibration of the rigid-frame structure is smaller than that of the pier structure.