Analyze the dynamic behavior of wagons subjected to harmonic excitation <u>L. Valente^{*}</u>, R. Marotta^{*}, V. Mainenti[#], F. Nogueira 4[#]

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Abstract

This study uses multibody simulation to analyze the dynamic behavior of wagons subjected to harmonic excitation. For this, the excitation frequencies that can cause resonance in tangents and submit the wagons to the risk of derailment were identified. The excitation frequencies were obtained by variation of the speed and using characteristic wavelengths of MRS Logística S.A. considering the parameter of cross-level irregularity. Signal processing techniques were used to identify within the wavelength range could be considered potentially harmful to harmonic roll mode. The track measures performed by TrackStar with larger amplitudes (Power) over 350 km of sign of track. These wavelengths were determined using the STFT (Short Time Fourier Transform) method. The wagons's natural frequency was identified using the eigenvalue and transient method of VAMPIRE dynamic simulator. The simulations were also made through VAMPIRE with the purpose to obtain the amplitude response for the parameters of derailment as L/V and wheel unloading, according to the criteria of the AAR. With the results of the response amplitude for different combinations of natural frequencies and excitation frequencies produced a map of responses that can be quickly used for determinate critical combinations of vehicle, rail and operation. Therefore is possible to compare the dynamic behaviour of wagons, increase speed, analyze the track maintenance, and can be useful to help the investigation of derailments.

References

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