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Observation of sinusoidal motion creating harmonic wavy pattern in the rail vehicle wheel flanges

Asadi Lari, A. Rezvani, M.A.

School of Railway Engineering, Iran University of Science and Technology, Tehran 16846, Iran

Abstract

Railway wheels are subject to kinematic oscillation and forces (normal and tangential) which are time and location dependent. The forgoing is due to a transverse slope in the tread region and the forces are functions of the vehicle weight, the suspension and braking systems, track topography and irregularities, and the wheel/rail profiles. As a result, a variety of patterns are generated in the wheel surface. An investigation in Iranian Railways was launched to determine the reasons for the high wheel wear rate of rail vehicles which often cause an asymmetric pattern within a wheelset. Therefore, for the purposes of this research two test bogies were marked and equipped with the apparatus for the further measurement of wheel wear. A development of circumferential pattern, for the first time, was observed in the flange region of wheel surfaces acquired by measured patterns created on the test bogies' wheels. Theoretical aspects of this harmonic pattern are developed and presented in this paper. © Shiraz University.

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