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An Electricity Consumption of a Train Drive System used in a High Speed Train Caused by Change of Mechanical Parameters of This Drive

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Abstract

The cost of maintenance, the reliability and the safety of railway operation depend strongly on the quality of the wheelsets and driving systems. Deformations and mechanical vibrations are phenomena associated with a functioning of majority of railway vehicle drivetrain structures. The time dependent variation of the contact forces between the wheels and the rails is highest importance, as sources of a torsion vibration in the systems. The knowledge about torsional vibrations in drive transmission systems of railway vehicles is of a great importance in the fields dynamics and fatigue of the mechanical systems. An electromechanical model of the railway vehicle drive system has been presented in the work. The model has been used to investigate self-excited torsional vibrations occurring in the railway vehicle drive system. In the investigations their influence of the torsional vibration on the electric parameters of the drive motor are also considered. From these results obtained using numerical simulations indicated that the self-excited torsional vibrations are strongly dependent on the characteristics of the adhesion coefficient in wheel-rail contact zone. The values of electrical parameter characterizing the driving motor obtained from electric motor model have been used for determine the amounts of electric energy consumed by self-excited torsional vibration in the wheelset drivetrain system.