



XXV French-Polish Seminar on Mechanics

Book of abstracts

Bourges, France 2017

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An influence of electromechanical coupling effects on stability of the drive systems of machines and railway vehicles driven by electric motors

Abstract

To ensure a reliability and unconditional security of drive system of machine and railway vehicles drive by electric motors, the electromagnetic output traction force and torques should drive stably, otherwise the shaft train vibration caused by motor torque ripple will affect the fatigue life of the device and the operation security of the driven object. For this reason an investigation of the dynamic response and stability of a electromechanical drive train system was done. For this purpose a dynamic model integrated with an electric motor and control systems to simulate the vibration in the component parts of the drive system were created. Such an approach for modelling of the considered electrical drive systems coupled with elements of a driven machine or vehicle is particularly important when the purpose of such modelling is to obtain an information about the transient phenomena of system operation, like a run-up, run-down, operation dynamic overloads and a loss of adhesion in the wheel-rail zone. The obtained results have demonstrated that the electromagnetic transient processes generated in the electric motor should be taken into account for the use of the assessing the stability of the system. The knowledge about stability of drive transmission systems of machines and railway vehicles is of a great importance in the field of dynamics and material fatigue of the mechanical systems.

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