Maxwell-Element Model for Describing Conveyor Belt Stresses

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1 January 2022

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Abstract. The wave equation which allows researching the occurrence and the dynamic stress propagation in the conveyor belt is obtained for the conveyor belt, the material of which corresponds to the Maxwell element model. The boundary and initial conditions were written for power switching modes to consider the mechanical characteristics of the asynchronous engine with the phase rotor, which determine the dependencies between the traction torque and the rotational speed of an asynchronous electric engine with a phase rotor. The estimate is given to separate wave equation terms. The expression is obtained for the calculation propagation belt speed of the dynamic stress along the conveyor belt. The conditions are shown by which the wave equation will correspond to the model of Hooke's element. By designing the dependencies between the traction torque and the rotational speed for a specified interval of the mechanical characteristic, the linear approximation is used. It is shown that the change of the material flow value coming into a section input doesn't render a special influence on the dynamic stresses propagation process along the conveyor belt. The expressions are obtained for the dynamic stress propagation speed calculation. By deriving the wave equation it is assumed the uneven material distribution along the conveyor section.

Keywords: dynamic stress, conveyor belt, asynchronous electric engine.

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