

On the influence of rubber tracks vibrations upon energy losses in crawler vehicles drive systems

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Abstract: Nowadays, earthmoving machinery and off-road vehicles are often fitted with rubber tracked undercarriages. In order to properly estimate power demand of vehicles of this type and improve the efficiency of their undercarriages, computational models of their external and internal motion resistance are required. The issue of external motion resistance has been described in the literature, however, models of the internal motion resistance are still hardly available. Hence, a research in this field is conducted by The Department of Off-Road Machine and Vehicle Engineering (DORMVE) at Wrocław University of Science and Technology. While driving a tracked vehicle, transverse vibrations of track spans are often induced due to a number of reasons, e.g.: radial run-out of wheels of the undercarriage, non-uniform track weight distribution, dynamic loads acting on the vehicle while negotiating uneven terrain etc. High amplitude vibrations of metal link tracks of high speed vehicles usually lead to noticeable increase in their motion resistance. On the other hand, the influence of rubber tracks vibrations on energy efficiency of crawler vehicles has not been already discussed. The article presents the main assumptions of a model for estimation of energy losses attributed to rubber tracks vibrations that is being currently developed by DORMVE. A method for determination of parameters involved in the model, i.e. bending stiffness and logarithmic decrement of vibrating track, as well as the results of the experiments carried out on an exemplary rubber track will be discussed.

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