

The influence of lateral swaying on the trajectory of articulated rigid body vehicles

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Abstract: The phenomenon of snaking of articulated vehicles is affected by many factors. One of them is lateral swaying of the vehicle caused by driving on uneven road, which can significantly affect the vehicle's steering angle and the trajectory of its motion. Typically, articulated vehicles are fitted with a rear oscillating axle. The wheels that prevent the vehicle from tipping over are the front ones, which are attached directly to the vehicle frame. For this reason, the front wheels are loaded with lateral forces. Since the front wheels are distant from the steering joint, the resulting torque caused by the lateral forces tends to rotate the front body of the vehicle about the steering axle. This torque is counteracted (compensated) by the torque created by the steering system. Changes in the steering angle are proportional to the hydraulic steering system stiffness. Numerous experimental tests indicate that the relationship between stiffness and steering angle is not linear and might be approximated with an exponential function. The lateral (roll axis) oscillations are cyclical, an alternate angle change in the steering joint is observed. There is an alternate change in the steering angle due to changes in lateral forces acting on the front wheels. The article presents the results of the research on the impact of oscillations about the vehicle's lateral symmetry axis on the trajectory of vehicle motion.

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