

Stability of three wheeled narrow vehicle

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Abstract: A serious problem in modern cities are congestions and a lack of parking space, especially in cities centers. The narrow, three-wheeled vehicles seems to be solution to these problems. The work presents a description of the designed and developed urban individual mean of transport. The implemented prototype is a narrow, three-wheeled vehicle with electric drive designed as a delta type vehicle. Road tests of controllability were performed — a constant radius of turn and constant steering angle tests and stability of the vehicle using the single lane change maneuver. A mathematical vehicle model with three degrees of freedom (3DOF) was arranged, including lateral displacement, roll and yaw angle rotation. These road tests were used to validate parameters in the vehicle model. A vehicle motion simulation was performed in accordance with the NHTSA J-turn maneuver procedure. The results of the simulation allowed the assessment of the impact of driving speed on the lateral stability of the vehicle by the determination of the dynamic roll angle limit.

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