

## The control model's impact on the car and trailer set movement in experimental and simulation research

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*Abstract:* Parameters and characteristics of the one of the control algorithm modules' of the autonomous passenger car with a trailer has been considered in this study, during avoiding suddenly appearing obstacle. It is a driver-controller model, working in fuzzy logic as a signals processing system, which signals are measured while driving a car with a trailer. According to that, model identifies situations that require reaction. The trailer affects the vehicle which may lead to critical situations specific to analysed set like snapping or jackknifing. The issue under consideration includes analysis of relationship between several non-linear models (car, trailer, tire cooperation with a road surface and driver-controller model). Significant areas of stability reduction have been identified, especially when there is a sudden obstacle to a vehicle traveling at high speed. During the experimental research, main focus was on validating the vehicles' model and their reactions while avoiding the obstacle, to determine the symptoms of critical situations resulting from the movement of a set of vehicles. In the next step, parameters and characteristics that may determine the dynamics and stability of the models in similar situation was analysed and selected. The signals and indicators selected for the analysis, describing the vehicle's reaction, were treated as input information to the driver's model. The values increase rapidly with the driving speed and the towing car's steering wheel's rotation angle. Signals of particularly high sensitivity in various road conditions have been indicated.

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