15th INTERNATIONAL CONFERENCE
Dynamical Systems — Theory and Applications
December 2-5, 2019. Lodz, POLAND.

DSTA 2019

paper id: CON116

Influence of control system parameters and it's disturbances on lane change process

Mirosław Gidlewski, Leszek Jemioł, Dariusz Żardecki

Abstract: Automatic control of lane change is a key to automate more complex maneuvers. According authorial concept the lane change controller has a mixed structure. In the open-loop structure it works as a set-point signal generator which generates three variables determining the lane change maneuver: a set-point input signal of steering system angle, and two set-point output signals describing desirable vehicle's trajectory (lateral and angular shifts of the car). In the closed-loop structure it works as a steering signal corrector which corrects on-line (by two Kalman regulators) the steering system angle signal. Error signals are calculated by comparison of reference (generated) and real (measured) signals expressing vehicle's trajectory. The set-point reference signals, as well as regulators are based on a simple linear reference model (simplified "bicycle model"). For validation of the controller algorithm extensive simulation investigations have been executed. In these investigations, as the virtual object of control – the very detailed (MBS-type, 3D, nonlinear, and verified experimentally) mathematical model of medium-duty truck has been used. The authors' model of a conceptual control system and extensive simulation investigations were presented at several authors' papers. This paper presents unpublished results of the studies, which are concerned on sensitivity of the control system to it's parameters and it's disturbances (dead zone of measure process, time delay of data processing, etc).

[1)] Mirosław Gidlewski, Ph.D.: University of Technology and Humanities in Radom, Automotive Industry Institute, 26-600 Radom, Chrobrego 45, Poland (PL), miroslaw.gidlewski@uthrad.pl .

[2)] Leszek Jemioł, M.Sc.: University of Technology and Humanities in Radom, 26-000 Radom, ul. Chrobrego 45, Poland (PL), leszek.jemiol@uthrad.pl .

[3)] Dariusz Żardecki, Associate Professor: Military University of Technology, 00-908 Warsaw 49, gen. Sylvester Kaliski 2, Poland (PL), dzardecki@wat.edu.pl , the author presented this contribution at the conference in the special session: "Dynamics of vehicles" organized by A. Harlecki.