

RESULTS OF PhD THESIS ABSTRACT
"ROAD VEHICLE DYNAMICS IN URBAN AND EXTRA-URBAN ENVIRONMENT"

Author: Eng. Cătălin-Dumitru DARIE
e-mail: catalin.darie@gmail.com, tel. 0733944311
PhD supervisor: Bg. gen. (r) emeritus univ. prof. eng. Ion COPAE

The main purpose of the PhD thesis is to highlight some particularities of road vehicle dynamics in urban and extra-urban environments, for improving the vehicle performances, by using the experimental data obtained from tests.

Chapter 1 is entitled *Current approaches for vehicle dynamics and work objectives*. A synthesis is presented that highlights the main features of current approaches to vehicle dynamics from specialty literature, PhD theses, journals and scientific communication sessions. The objectives of the PhD thesis are presented.

Chapter 2 is entitled *Experimental research*. There are presented the used vehicle, its engine, and the used equipment and software. The tests were carried out with a Ford Focus vehicle powered with a diesel engine. The experimental data acquisition system is from Ford's equipment and software. From all the data obtained from experimental tests, 40 samples from the urban environment and 40 samples from the extra-urban environment were stored for further studies. Graphs with values of the measured quantities are presented.

Chapter 3 is entitled *Comparative functional analysis of vehicle dynamics*. Based on the experiments, comparative statistical analyses are performed when the vehicle is running in urban and extra-urban environments, using the first-order statistical characteristics. There are presented comparative functional particularities from both environments, urban and extra-urban, with establishing some conclusions that highlights especially the differences.

Chapter 4 is entitled *Comparative analysis of vehicle's dynamic regime performances*. There are presented and established the dynamic and economic performances. The energy efficiency of the vehicle, assessment criteria and their values are established and presented using experimental data. The influences of functional factors on performance are studied by using variance, informational and sensitivity analyzes. Comparative conclusions are drawn regarding the dynamics of vehicles in both environments.

Chapter 5 is entitled *Comparative multivariable statistical analysis of vehicle dynamics*. Specific concepts and algorithms for multivariable statistics are presented, which are applied in the case of large data sets, as it is in case of vehicles equipped with on board computer. For this purpose, spatial and canonical correlation analysis, principal component analysis, factor analysis, group analysis, discriminatory analysis, data paternity classification and multidimensional scaling are used. These procedures ensured the detection of central evolutionary trends and the reduction of the amount of data. Comparative conclusions are presented on the dynamics of vehicles in urban and extra-urban environments.

Chapter 6 is entitled *Multidimensional comparative analysis of vehicle dynamics*. It aims at matrix analysis of dynamics, by using specific concepts and algorithms, such as eigenvalues, rank, conditional number, singular values. It also aims at tensor analysis of dynamics, by using tensors, singular values and multidimensional mathematical models. Comparative conclusions are drawn on the dynamics of vehicles in urban and extra-urban environments.

Chapter 7 is entitled *Reconstruction of road accidents in urban and extra-urban environments*. There are presented the particularities of road accidents in the two environments. Reconstruction of two real road accidents from exploitation is performed by using the PC-Crash software.

Chapter 8 is entitled *Main contributions, openings, dissemination of research results*. There are presented realized contributions from studying the vehicle dynamics in urban and extra-urban environments. Some openings that the paper offers are highlighted. The dissemination of the research results, as well as the list of published works are presented.