

PHD Thesis Summary
"CONTRIBUTION TO THE STUDY OF DYNAMICS OF THE VEHICLES"

Author: Eng. Gabriel-Ionuț DOROBANȚU
E-mail: gabi_dorobantu@yahoo.com, tel. 0744104070
PHD supervisor: gl. bg. (r.) prof. univ. dr. Eng. Ion COPAE

The main purpose of the PhD thesis is to elaborate and to apply a theoretical and experimental study algorithm of dynamics of a vehicle provided with on board computer, with transducers and built-in manufacturing execution elements, using on board diagnosis tester and GPS equipment.

Chapter 1 presents a synthesis of the concerned issue as well as objectives of the study. Dynamic complexity treatments both theoretical and experimental are highlighted of an electronically controlled vehicle. There are presented principal theoretical aspects, dynamics study software, as well as, experimental equipment used for the tests.

Chapter 2 of the PHD thesis presents the main navigation and positioning systems by satellites used worldwide. There are presented the four most important systems: American NAVSTAR GPS, Russian GLONASS, European GALILEO and Chinese BeiDou. In addition there are described complementary European Systems: EGNOS, EUPOS, ROMPOS and the American WAAS. Also, the main computational relations of the used kinematic parameters in the navigation and satellite positioning systems are presented.

Chapter 3 is for experimental researches realised with specialized Ford tester and Raceologic GPS on Ford Focus vehicle, equipped with Diesel engine. The objectives of the experiment as well as necessary experimental equipment are presented. Also results obtained from tester and from GPS are presented. The results obtained with the two experimental equipment are compared. Studies of the influence of the main functional factors on the economic and dynamic performance of the vehicle are figured, by using the correlation analysis, variance analysis and information analysis.

In Chapter 4 there are reproduced the main mathematical models of the used tire in the specialty literature and are set the tire sizes used on the Ford Focus vehicle.

Chapter 5 is intended to present the main mathematical models of vehicle dynamics used worldwide. Models are depicted describing motion in the horizontal plane and in the three-dimensional space. In these models, in order to increase complexity, respectively the numbers of freedom degrees, the functional parameters that describe the dynamics of the Ford Focus vehicle are determined. Most of the models cannot be found in specialty literature.

Chapter 6 figures out systemic mathematical models of vehicle dynamics. For this purpose system and process identification are applied using experimental data from the tests. This model has full and fractional order; the latter were presented for the first time in premiere in specialty literature.

In chapter 7 spatial dynamics simulations of the vehicle are carried out, including with Ford Focus vehicle. There are presented four occurrences that appear in exploitation: moving on a required route, moving with roll over, moving with a fix obstacle hitting and moving in turn.

Chapter 8 presents contributions for the study of vehicle dynamics. Some study directions offered by the PHD thesis are presented. Dissemination of the obtained results is highlighted and the list of published papers is presented.