PhD THESIS ABSTRACT

”CONTRIBUTIONS TO THE STUDY OF AUTOMOBILE DRIVING BY USING REVERSE DYNAMICS ALGORITHM”

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PhD thesis studies the reverse problem, particularly the reverse dynamics in motor vehicles field. The approach, for the first time in our specialty literature, of reverse topic came out from a practical necessity: in direct problem, driving speed represents an unknown size but there are situations when driving speed is known, for example, in case of standard testing cycles, which represents the prerogative of reverse problem.

Chapter 1 contains a synthesis of current stage of the problem mentioned above, but also main objectives of PhD thesis. Four important characteristics specific to reverse topic are highlighted. Likewise, there are presented main elements related to experimental research, which offer a database containing functional parameters and which covers main situations encountered during running. The experiments were conducted with a Logan Laureate vehicle, equipped with gasoline injection engine and on-board computer, retaining 80 the most suggestive experimental samples. Experimental data were statistically processed, which led to the possibility of highlighting time variation character of different functional parameters, making comparisons between different running situations, concluding related to the way an electronic control engine works etc. To this end, first order statistical characteristics were appealed, frequently used in specialty literature but also other elements which mathematical statistics operate with.

Chapter 2 is intended for applying reverse dynamics algorithm to vehicle classical dynamics. It is shown the reverse dynamics algorithm and it is established the wheel energy balance. Likewise, there are established functional sizes values in case of parametric uncertainties.

Chapter 3 is intended for applying reverse dynamics algorithm in detection problems. It is presented the topic of system detection, there are mentioned discrete and continuous mathematical models. Also, it is made a discrete and continuous detection by establishing mathematical models of motor vehicle dynamics and engine functioning.

In chapter 4 is presented the reverse dynamics algorithm applied to standardised cycles of experiment. In addition, there are shown the european, american, japanese and global cycles of experiment. It is also presented the reverse dynamics algorithm for this case. There are established functional sizes values during classical cycles of experiment and based on those sizes there are drawn cycles of experiment.

Chapter 5 is intended for applying reverse dynamics algorithm to vehicle’s engine detection, control and diagnose. There are established frequently used mathematical models in the control and diagnose of vehicles and engines, based on a model.

In chapter 6 are presented car accidents reconstruction based on reverse dynamics algorithm. It is shown the appropriate reverse dynamics algorithm and there are made car crash reconstructions that took place in practice. There are established those sizes values, specific to a car crash, and those used in impact biomechanics.

Chapter 7 contains main contributions to theoretical and experimental study of vehicles running by applying the algorithm of reverse dynamics. There are stated some openings offered by the paper. Likewise, it is highlighted the dissemination of research results and it is presented the list of papers published during doctoral preparation.