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REGISTRATION AND PROCESSING OF FUNCTIONAL PARAMETERS VALUES FOR INTERNAL COMBUSTION ENGINES

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Abstract:
The article represents a study regarding the creation of a correlation between the functional parameters of the internal combustion engines, both diesel and petrol ones, with the help of the MATLAB mathematic software. The values of these parameters were registered with the help of the mega macs 55 equipment, in real time, the motor vehicles running in urban traffic.

Keywords:
internal combustion engine, correlations, mathematic software, intelligent diagnosis, OBD

1. INTRODUCTION

The best results in tracking down defects immediately after their appearance can be reached if the motor car systems performance is permanently supervised, which involves the development of certain on board diagnosis techniques and equipment. Their evolution has been and is closely linked to the evolution of motor car construction. Thus, the appearance of microprocessor-operated systems has enabled a considerable increase in the number of objectives monitored and the number of registered and analyzed parameters.

The OBD (On Board Diagnostic) system monitors the engine performances and evacuation emissions, including the self-test sensors during vehicle running, to make sure it works. The board computer can identify a problem before it is tracked down by the vehicle driver, warning him/her about the failure by displaying a bright light. Most bright witnesses will display “Check Engine," “Service Engine Soon" or an engine symbol.

As soon as the OBD detects a problem, a failure code (error) is registered in the motor vehicle computer. When the vehicle is placed on an OBD l/M checking tester, this code will help the technician track down and repair the defect.

OBD-II is a new standard introduced in the second half of the ‘90, insuring the engine and chassis, equipment accessories and car installation control almost entirely. OBD II is an extensive set of standards used by SAE, and adopted by EPA and CARB (California Air Resource Board).

Certain motor vehicle models equipped with OBD-II are not 100% compatible. There are three basic OBD-II protocols used, each with minor variations of the communication model between the board computer and scanning outrigger.

Based on the OBD-II protocols, and connecting a mega macs 55 tester, the main functional parameters were registered for two types of engines. These values were transferred to the MATLAB mathematic software, with whose help different correlations were created.

2. ENGINE TESTING

The study was conducted on two different engines, petrol and diesel, and the data were obtained with the help of the mega macs 55 equipment from Gutmann company.

The diagnosis of the engine management was made in urban traffic, the equipment being connected through the OBD coupling to the engine command central unit. The data prevailed are displayed in the form of the data shown in the pictures below.

As it can be observed, the system allows the registration of the engine functional parameters in graphic form, and by moving the cursor along the abscissa, in the left side of the display one can see the actual values of these parameters at a certain point in time.

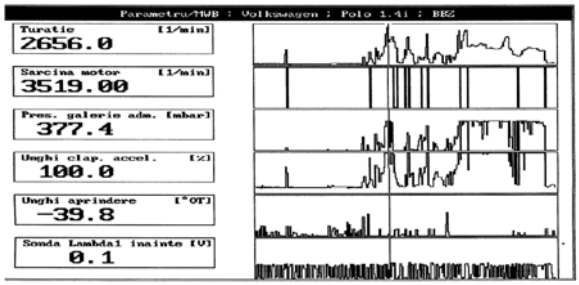

Figure 1. VW Polo, 1.4i engine

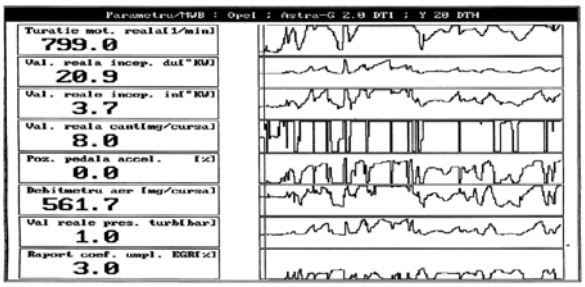

Figure 2. Opel Astra 2.0 DTI engine

3. PROCESSING OF EXPERIMENTAL DATA

Following the measurements made in traffic, in a 15 minute interval, the data were introduced in a specialized processing program, thus a series of correlations being made, from which conclusions can be drawn referring to engine running in different revolutions and charges specific to urban traffic.

The study was conducted on the diesel engine fitted on the Opel Astra model and on the VW Polo 1.4i petrol engine.

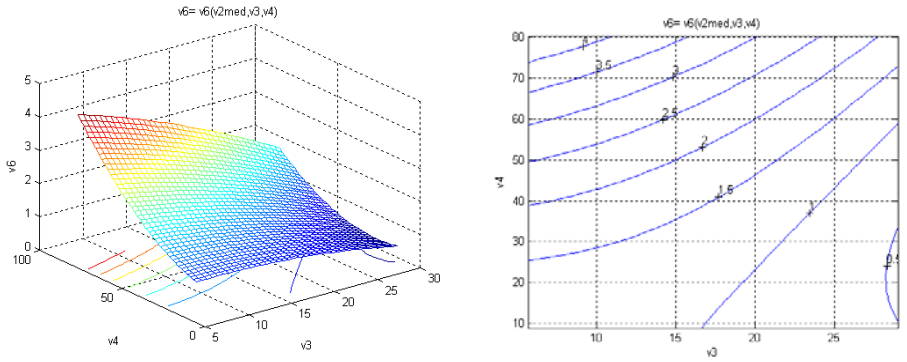

Figure 3. Real value of the oversupply pressure (v6) function of the real quantity injected (v3) and the acceleration lever position (v4) for the Opel Astra engine

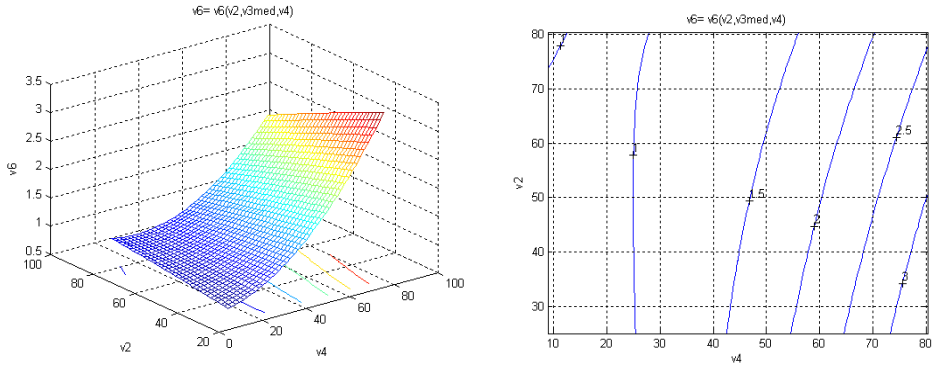

Figure 4. Real value of the oversupply pressure (v6) function of the real advance in the injection (v2) and the acceleration lever position (v4) for the Opel Astra engine

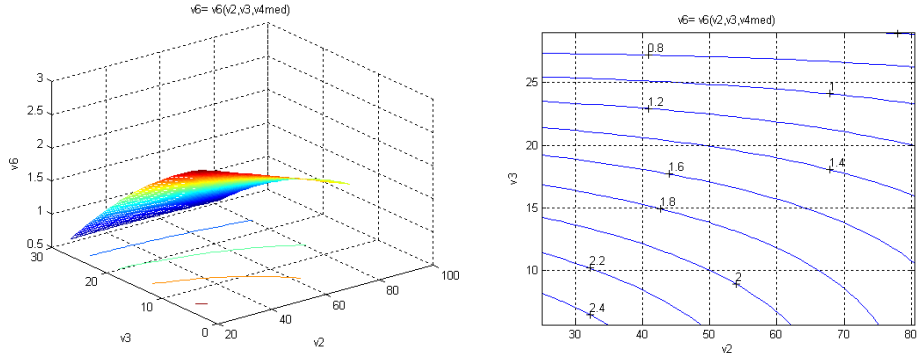

Figure 5. Real value of the oversupply pressure (v6) function of the real advance in the injection (v2) and the real quantity injected (v3) for the Opel Astra engine

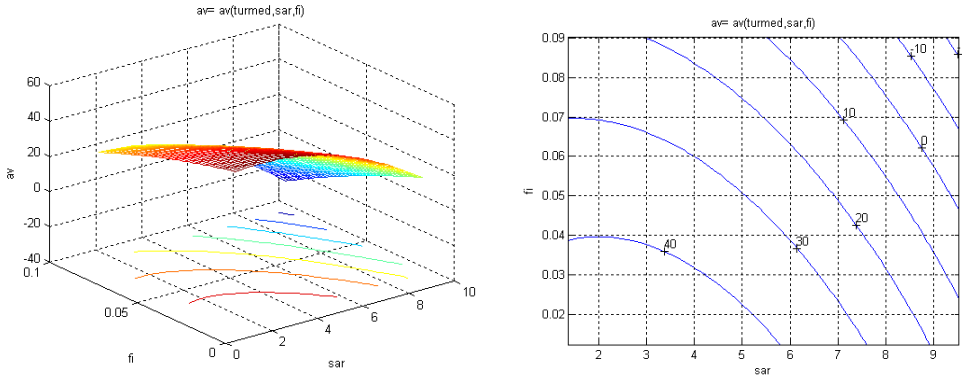

Figure 6. Value of the advance function of load and the acceleration choke opening angle for the VW Polo 1.4i engine

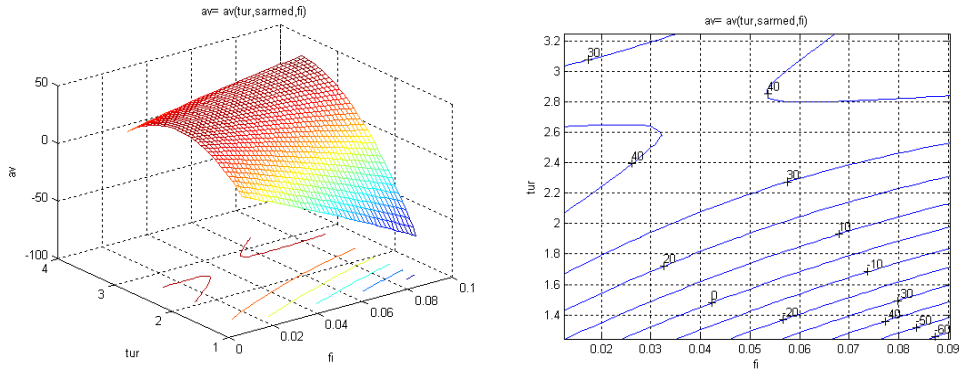

Figure 7. Value of the advance function of revolution and the acceleration choke opening angle for the VW Polo 1.4i engine

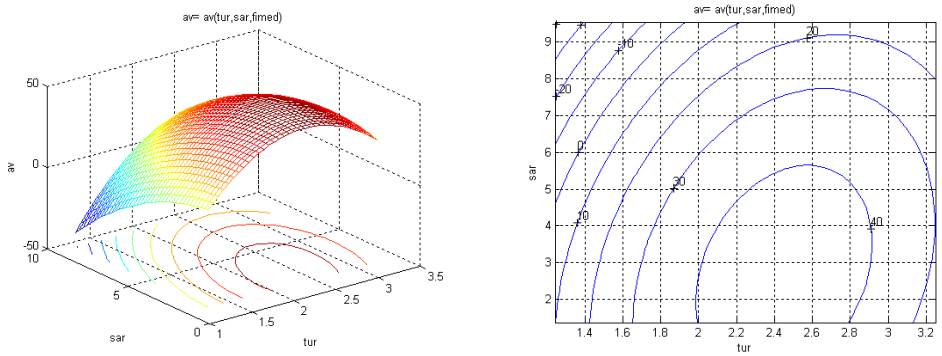

Figure 8. Value of the advance function of revolution and load for the VW Polo 1.4i engine

4. ANALYSIS OF RESULTS AND CONCLUSIONS

The registration system of the engine functional parameters allows only the sequence visualization of the prevailed data, based on which conclusions can be drawn regarding the functioning of different components.

Once these data are introduced in a specialized processing program, they can offer global information regarding the correlations which the command electronic unit makes during engine running between the different components that interact with one another.

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