METHOD OF TWO-DIMENSIONAL APPROXIMATION OF FUEL CHARACTERISTICS OF AUTOMOTIVE ENGINES

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When modeling fuel consumption by automobile engines or calculating the current instantaneous or route fuel consumption of a car, there is a need to use data on the fuel characteristics of the engine with high data discreteness. This problem can be solved using approximation methods.

At the first stage, it is proposed to apply spline approximation of the engine performance speed characteristic in the coordinates of engine speed-effective torque. This makes it possible to clearly limit the field of operating modes of the automobile engine.

At the second stage, it is proposed to apply the procedure of two-dimensional approximation by polynomials of the 1st-4th order of the fuel consumption surface. To implement this procedure, a matrices with coefficients of the degrees of approximation polynomials have been prepared. These matrices contain complete and incomplete sets of coefficients of approximation polynomials by approximation orders. The choice of the order of polynomials and a complete or incomplete set of coefficients is made by the researcher. The program code of the approximation procedure also provides for determining the quality of agreement of the approximation with the experimental data by determining the reliability index R^2. The figure below shows an example of a two-dimensional approximation of brake specific fuel consumption, where the yellow dots show the experimental data and the red approximation surface.

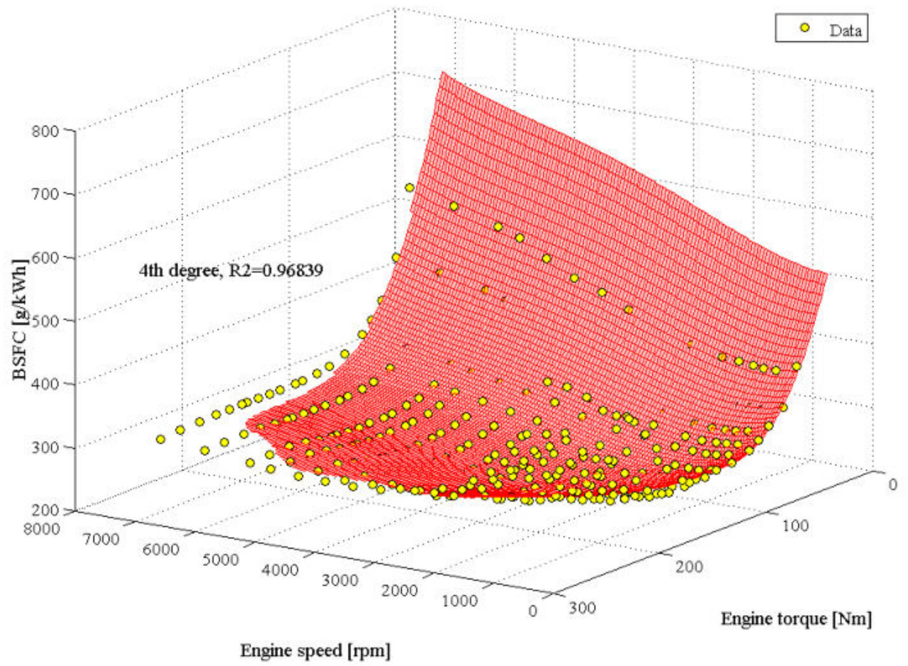

Figure – Approximate surface of brake specific fuel consumption