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TAKING INTO ACCOUNT THE EMISSIONS OF HEAT ENERGY AND MOTOR FUEL VAPORS IN THE CRITERIA-BASED ASSESSMENT OF THE ECOLOGICAL SAFETY LEVEL OF EXPLOITATION PROCESS OF RECIPROCATING ICE

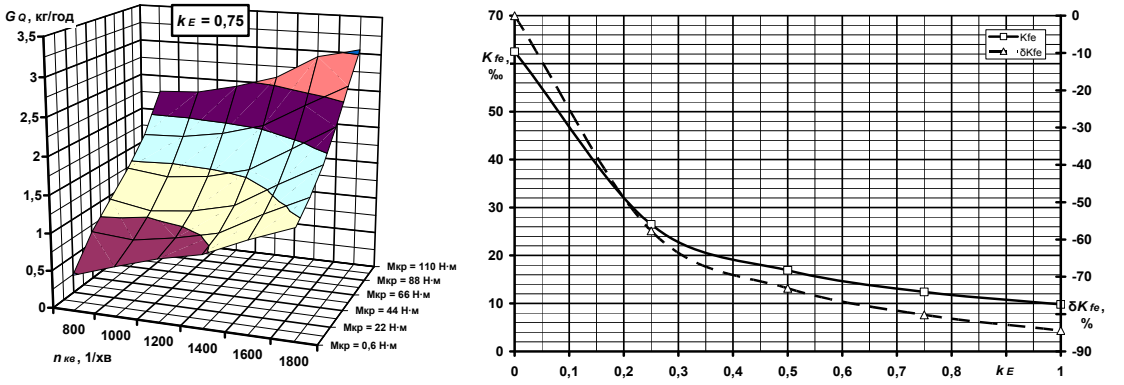
Shpotya M.O., Rudenko Yu.V., Poloshchuk T.R., Kasyonkina N.D., NUCD of Ukraine,
SA – Kondratenko O.M., DSc(Eng.), Assoc. Prof., NUCD of Ukraine

In structure of complex fuel-ecological criterion K_{fe} of Prof. Parsadanov there is the value $\Sigma(A(k)\cdot G(k))$ – the total reduced mass hourly emission of the considered pollutants [1]. To solve the problem of taking into account the emission of motor fuel vapors in the study, it is proposed to supplement the formula for its determining by the component $A(RB)\cdot G(RB)$, and to take into account thermal energy – by the component $A(Q)\cdot G(Q)$. The ponderability of thermal pollution of components of environment as the ecological safety factor in the exploitation process of PP with RICE in this study is proposed to quantify by formula (1), where A_{fuel} = 38.4 – ponderability coefficient of fuel component of the K_{fe} criterion; k_E – energy coefficient; E_{RICE} and E_W – total amount of energy produced by RICE and anthropogenic PP in the world energy balance, MJ. The value of the energy coefficient k_E = 0.75 was used in this study, then the value of the coefficient $A(Q)$ = 28.8. The value of the mass hourly emission of motor fuel G_{fuel} as the indicator of thermal pollution of environment in this study is proposed to be determined by formula (2), in which η_e is the effective efficiency coefficient of the engine. The distribution of the values of $G(Q)$ on the field of exploitation regimes of the autotractor diesel engine 2Ch10.5/12 at k_E = 0.75 is illustrated in Fig. 1,a. Graphs of the dependence of the values of the K_{fe} criterion and the effect δK_{fe} on the value of the coefficient k_E in Fig. 1,b and are described by the method of least squares by formula (3).

$$A(Q) = A_{fuel} \cdot k_E = A_{fuel} \cdot E_{RICE} / E_W, \quad (1)$$

$$G(Q) = G_{fuel} \cdot (1 - \eta_e), \text{ kg/h}. \quad (2)$$

$$K_{fe} = 1{,}931\cdot 10^2 \cdot k_E^4 - 5{,}168\cdot 10^2 \cdot k_E^3 + 5{,}143\cdot 10^2 \cdot k_E^2 - 2{,}433\cdot 10^2 \cdot k_E + 6{,}250\cdot 10, \text{ ‰}, \quad (3)$$



a b

Figure 1 – Results of the study

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