

# МІНІСТЕРСТВО ВНУТРІШНІХ СПРАВ УКРАЇНИ ДОНЕЦЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ ВНУТРІШНІХ СПРАВ ФАКУЛЬТЕТ 1 КАФЕДРА СОЦІАЛЬНО-ГУМАНІТАРНИХ ДИСЦИПЛІН



## МАТЕРІАЛИ

V Всеукраїнської науково-практичної курсантської (студентської) конференції іноземними мовами

«ЗАБЕЗПЕЧЕННЯ ЕКОЛОГІЧНОЇ БЕЗПЕКИ ТА ПРОТИДІЯ ПРАВОПОРУШЕННЯМ У СФЕРІ НАВКОЛИШНЬОГО СЕРЕДОВИЩА»

«ENSURING ENVIRONMENTAL SAFETY AND COUNTERACTION TO DELINQUENCY IN AREA OF THE ENVIRONMENT»

«GEWÄHRLEISTUNG DER UMWELTSICHERHEIT UND UMWELTKRIMINALITÄTSBEKÄMPFUNG»

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damage to the environment. New research on the effects of pollutants on the ocean and its life should be encouraged, and biological water treatment should be given priority.

More rational frameworks need to be developed for decisions on how to recycle waste and how to dispose of it. Purposeful and well-thought-out actions will be needed to radically improve the situation. A responsible and effective policy on the aquatic environment will be possible only if we receive reliable data on the current state of the environment, sound methods to reduce and prevent damage to nature by man.

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### Анотація

Розглянуто проблематику забруднення Світового океану, причини його забруднення та наслідки, висвітлено чинники через які забруднюється океан, а саме: стоки добрив із полів, хімічні відходи від побутових господарств та промисловості, видобуток корисних копалин та розливи нафти, поховання радіоактивних відходів, пластикові відходи. Виходячи із зазначеного, сформовано висновки та шляхи вирішення проблеми забруднення Світового океану.

## **Polishchuk T., Kasionkina N., Shpotia M.**National University of Civil Defence of Ukraine Науковий керівник – О.М. Кондратенко

DETERMINATION OF THE VALUES EMISSIONS OF HEAT ENERGY AND MOTOR FUEL VAPORS FOR APPLICATION IN THE CRITERIA-BASED ASSESSMENT OF THE ECOLOGICAL SAFETY LEVEL OF EXPLOITATION PROCESS OF VEHICLES WITH RECIPROCATING ICE

The mathematical apparatus of the complex fuel-ecological criterion  $K_{fe}$  of Prof. Parsadanov is described in [1] and improved in [2].

In its structure there is the value of the total reduced mass hourly emission of the considered pollutants (in kg/h)  $\Sigma(A(k)\cdot G(k))$ , which is the sum of the products of the mass hourly emission of the  $k^{th}$  legislative normalized pollutant G(k) in the EG flow and the ponderability coefficient A(k) of the pollutant.

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 determining  $\Sigma(A(k)\cdot G(k))$  by the component  $A(RB)\cdot G(RB)$ , and to take into account thermal energy – by the component  $A(Q)\cdot G(Q)$ .

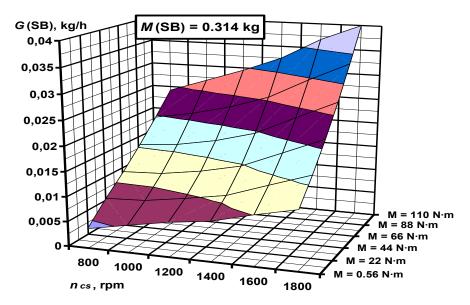
The distribution of the values of fuel vapor emissions caused by phenomena of large and small reservoir (vehicle fuel tank) breathing -G(SB) and G(IB) — on field of operating regimes of the 2Ch10.5/12 autotractor diesel engine is shown in Fig. 1.

The ponderability of thermal pollution of components of environment as the ES factor in the exploitation process of PP with RICE in this study is proposed to quantify by formula (1).

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

where  $A_{fuel} = 38.4$  – ponderability coefficient of the 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 (WEB), MJ.

The value of the energy coefficient  $k_E = 0.75$  was used in this study, then the value of the dimensionless coefficient A(Q) = 28.8.



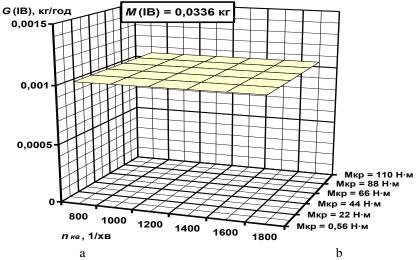


Figure 1 – Distribution of the values of G(SB) (a) and G(IB) (b) on field of operating regimes of the 2Ch10.5/12 autotractor diesel engine

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  $\eta_e$  is the effective efficiency coefficient of the engine.

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

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. 2,a.

Graphs of the dependence of the values of the  $K_{fe}$  criterion and the effect  $\delta K_{fe}$  on the value of the coefficient  $k_E$  in Fig. 2,b and are described by the method of least squares by formulas (4) and (5) ( $R^2 = 1,0$ ).

$$\begin{split} K_{fe} &= 1,931 \cdot 10^2 \cdot k_E^4 - 5,168 \cdot 10^2 \cdot k_E^3 + 5,143 \cdot 10^2 \cdot k_E^2 - 2,433 \cdot 10^2 \cdot k_E + \\ & 6,250 \cdot 10,\%,(4) \\ \delta K_{fe} &= 3,051 \cdot 10^2 \cdot k_E^4 - 8,203 \cdot 10^2 \cdot k_E^3 + 8,201 \cdot 10^2 \cdot k_E^2 - 3,893 \cdot 10^2 \cdot k_E + 3,015 \cdot 10^{-10},\% \, (5) \end{split}$$

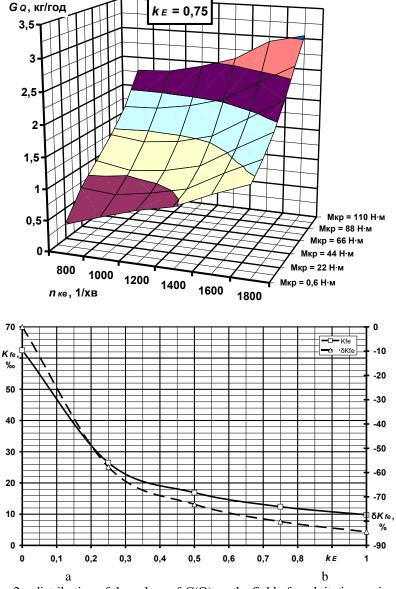


Figure 2 – distribution of the values of G(Q) on the field of exploitation regimes of the 2Ch10.5/12 autotractor diesel engine at  $k_E = 0.75$  (a) and graphs of the dependence of the values of the  $K_{fe}$  criterion and the effect  $\delta K_{fe}$  on the value of the coefficient  $k_E$  (b)

**Conclusions.** The study proposes and applies approaches to take into account the mass hourly emissions of motor fuel vapor and heat energy in the criteria-based assessment of the ecological level of exploitation process of power plants with reciprocating internal combustion engine.

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- 2. Parsadanov I.V. (2003) Improving the performance and competitiveness of diesel engines on the basis of a complex fuel-ecological criterion: monograph. Kharkiv, Publ. Prapor. 244 p.

## Анотація

У дослідженні пропонуються та застосовуються підходи до врахування масових годинних викидів парів моторного палива та теплової енергії при критеріальному оцінюванні рівня екологічної безпеки процесу експлуатації енергоустановок з поршневим ДВЗ.

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## ENVIRONMENTAL ISSUES IN UKRAINE

Human population size has grown enormously over the last hundred years. This means increase in demand for food, water, home, electricity, roads, automobiles and numerous other commodities. These demands are exerting tremendous pressure on our natural resources, and are contributing to pollution of air, water and soil. The need of the hour is to check the degradation and depletion of our precious natural resources and pollution without halting the process of development.

The word environment refers to all ecological units, which are naturally present on earth in the form of land, water, air, soil, forest, sunlight, minerals, living organisms etc. This earth is full of natural surroundings, some are biotic and some are non-biotic. Biotic elements are those elements like human, birds, animals, plants, and microorganisms. Whereas non-biotic elements are those which have no life like air, sunlight, water, land, soil, minerals etc. further it is also divided among four different sphere viz. biospheres, lithosphere, atmosphere and hydrosphere. In which hydrosphere is the largest part on the earth among all life on earth has become

## Наукове видання

## ЗАБЕЗПЕЧЕННЯ ЕКОЛОГІЧНОЇ БЕЗПЕКИ ТА ПРОТИДІЯ ПРАВОПОРУШЕННЯМ У СФЕРІ НАВКОЛИШНЬОГО СЕРЕДОВИЩА:

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