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FIRE AND CIVIL SAFETY

RESEARCH GROUP:

Ostapov Kostiantyn Mykhaylovych
PhD, Associate Professor of the Department
National University of Civil Defence of Ukraine, Ukraine

Senchykhin Yurii Mykolaiovych
PhD, Professor, Professor of the Department
National University of Civil Defence of Ukraine, Ukraine

Avetisian Vadym Heorhiiovych
PhD, Associate Professor of the Department
National University of Civil Defence of Ukraine, Ukraine

Gritsina Ihor Mykolaiovych
PhD, Associate Professor, Deputy head of Department
National University of Civil Defence of Ukraine, Ukraine

STUDYING THE PARAMETERS OF THE INSTALLATION WITH AN EXTENDED BARREL FOR EXTINGUISHING BY GEL-FORMING COMPOSITIONS

Mathematical models of the consumption of the weight of GFC for extinguishing the simulated fire are shown in the form of a polynomial of the second degree, unknown coefficients of which were determined using the least squares methods. The following functional dependences were obtained:

– weight of GFC, [kg]:

$$y = 1.485 + 0.66575 \cdot x_1 + 5.3875 \cdot x_2 - \\ -0.04375 \cdot x_1^2 - 0.41 \cdot x_1 \cdot x_2 - 6.875 \cdot x_2^2;$$

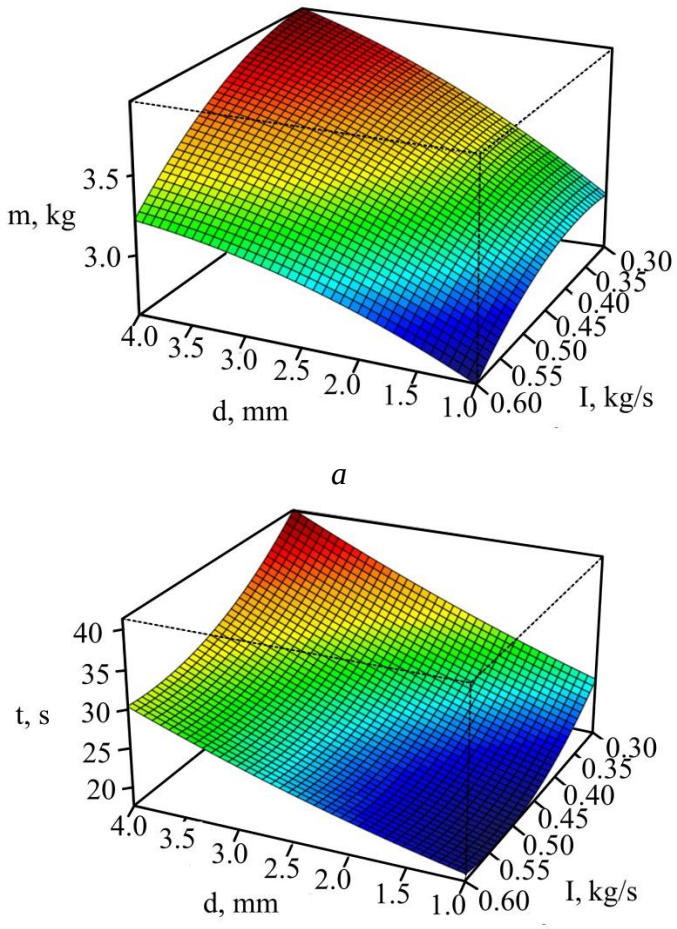
– extinguishing time, [s]:

$$y = 53.025 + 5.035 \cdot x_1 - 152 \cdot x_2 + \\ +0.375 \cdot x_1^2 - 4.8 \cdot x_1 \cdot x_2 + 150 \cdot x_2^2.$$

In the following dependences, which are shown in Fig. 4, parameter x_1 is the diameter of GFC drops, mm; x_2 is the intensity of GFC supply, kg/s.

The use of the performed calculations in system *R* enabled assessing all coefficients of the regression according to Student criterion at the significance level α=0.01 and the number of degrees of freedom N_0=10. Confidence interval was ±0.125 kg for the deviation of the weight of GFC and ±0.93 s for the time of extinguishing the simulated fire.

The obtained models were verified for adequacy by Fisher criterion (*F*-criterion) at the significance level α=0.01. Calculation value of *F*-criterion was 16.55 and 77.86 for two models, respectively, which is significantly higher than the tabular value F_*=5.67 for significance level α=0.01 and degrees of freedom κ1=4, κ2=11. Therefore, all constructed models are adequate with guarantee of 99.0 %.



a

b

Fig. 4. **Diagrams of functional dependences: *a* – consumption of GFC weight for extinguishing the simulated fire; *b* – consumption of time for extinguishing the simulated fire**

The use of both these models, and tabular data of testing extinguishing of simulated fire 1A makes it possible to determine the rational values of dimensions of drops is 1 mm and intensity of GFC spraying is 0.6 kg/s.

References:

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Contact details of the organizing committee:
NGO European Scientific Platform
21037, Ukraine, Vinnytsia, Zodchykh str. 18, office 81
Tel.: +38 098 1948380; +38 098 1526044
E-mail: scientia@ukrlogos.in.ua | URL: www.ukrlogos.in.ua

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