

NUMERIC EVALUATION OF THE EFFECTS OF EMERGENCY EXPLOSION OF HYDROGEN IN THE IN THE MACHINE

*Gordina A.I., student of gr. 365a  
National Aerospace University*

Emergency emissions into the atmosphere and the explosion of gaseous hydrogen in the closed space of the mining enterprise forms a shock-impulse effect on the maintenance personnel and equipment. Numerical assessment of the risk of impact of the impact of a shock wave on a person makes it possible to carry out an integrated analysis of the danger of an anthropogenic object, to evaluate the effectiveness of protection systems and evacuation.

The individual risk for a separate scenario of a technogenic accident  $R$  depends on the statistical probability of the occurrence of an accident  $P_a$  and the simulated probable probability  $P$  of human damage

$$R = P_a \cdot P. \quad (1)$$

The mathematical modeling of the explosion of gas clouds in the surface layer of the atmosphere allows us to obtain the spatio-temporal distribution of the main damaging factors: the maximum excess pressure  $\Delta P_\phi$  at the front of the shock wave

$$\Delta P_\phi = P_1 - P_0, \quad (2)$$

where  $P_1$ ,  $P_0$  – is the current and atmospheric pressure at the calculated point of space, and the momentum of the phase of compression  $I_+$  in the front of a shock wave

$$I_+ = \int_{\tau_a}^{\tau_a + \tau_+} \Delta P_\phi dt, \quad (3)$$

where  $\tau_a$ ,  $\tau_+$  – the time of the beginning and extension of the phase of compression of the wave.

Conditional probability  $P$  the damage to a person under the influence of an explosive shock wave depends on the probe function  $P_r$  – the upper limit of a definite integral of the normal distribution law with mathematical expectation 5 and dispersion 1.

$$P = \frac{1}{\sqrt{2\pi}} \int_0^{P_r} e^{-\frac{1}{2}(t-5)^2} dt. \quad (4)$$

The probe function for the fatal outcome of the service personnel due to the impact of a shock explosive wave is determined by the formula

$$P_r = 5 - 2,44 \cdot \ln \left[ 7,38 / \Delta P_\phi + 1,9 \cdot 10^3 / (\Delta P_\phi \cdot I_+) \right]. \quad (5)$$

The obtained fields of probability of human damage make it possible to estimate the influence of the closed nature of the room and the encumbering of space with such equipment as a mine electric locomotive.

\* Scientific advisor — Skob Y.A., PhD, Ass. Prof. of the department 304.