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Results of theoretical researches for definition optimum schemes of millisecond-delay blasting depending on mass distribution within a group and delay intervals are described.

Keywords: explosion, millisecond-delay blasting, delay interval, spectrum of vibrations.

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[1–6]
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.   [7, 8]
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$$\left(\frac{\partial U}{\partial t}+U\frac{\partial U}{\partial r}\right)=\frac{\partial_{\;r}}{\partial r}+\frac{_{\;r}-}{r},U=\frac{\partial r}{\partial t};\qquad(1)$$

$$\frac{\partial\rho}{\partial t}+\frac{1}{r}\frac{\partial(r\rho U)}{\partial r}=0,\qquad(2)$$

$$\frac{\partial E}{\partial t}-\frac{P}{\rho}\frac{\partial\rho}{\partial t}=0,\qquad(3)$$

–   ; U –   ; t –   ; P –   -
; r,θ,z –   ; S_i , $\sigma_i=S_i-P$ –
; $\overline{V}=V/V_0$, V , V_0 –

,   .
:

$$P=A\rho^n+B\rho^{\gamma+1},\qquad(4)$$

$A,\;n,\;B,\;\gamma$ –   ,
.

-                                      [9].

$$\frac{V}{V_0}=\sum_{i=1}^{3}\left[\frac{\gamma_i(P-P_0)}{\rho_{i0}c_{i0}^2}+1\right]^{-1/\gamma_i},\qquad(5)$$

: α_i ρ_{i0} –
; V_{i0},c_{i0} –
P_0 $(i=1-$, $i=2-$, $i=3-$ $).$
:

$$U=0,\;P=P_n,\;\rho=\rho_n\qquad 0\le r<r_0;$$
$$U=0,\;P=\sigma_r=\sigma_\theta=0,\quad\rho=\rho_0\qquad r_0\le r.\qquad(5)$$
:

1)   –   ;

2)   .

(1)–(5)

« » [9]

[9].

r_i

i- Q_i,

$$(u_{\max})_i = k(Q_i / r_i)^{\mu}, \qquad (6)$$

(6)

$k,$ ⸚ –   ,

[10]. i-

$$u_i = (u_{\max})_i e^{-\nu t} \sin{}_i t, \qquad (7)$$

$(u_{\max})_i$ – i-   ,   –

; ${}_i$ – i-   .

n

Δt

$$u = \sum_{i=1}^{n} k(Q_i / r_i)^{\mu} e^{-\nu t} \sin{}_i \, t - \, i - \, \Delta t \,. \qquad (8)$$

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$\Delta t = 0,02\,\text{c}\,.$ 112,4   .

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$Q_1 = 36,0$ $q.$

: $Q_1 = q,\ Q_2 = 1,4\,q,$ $Q_3 = q$;   –

$Q_1 = 1,2q,\ Q_2 = q\,,\ Q_3 = 1,2q\,.$

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1000   .

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$Q_1 = 0,9q, \ Q_2 = 1,6\,q, \ \ Q_3 = 0,9q$; –

$Q_1 = 1,4q, \ Q_2 = 0,6q, \ Q_3 = 1,4q$ (. 2,).

$Q_1 = 1,1q, \ Q_2 = 1,2\,q, \ \ Q_3 = 1,1q$; $\qquad Q_1 = 1,2q, \ \ Q_2 = q$,

$Q_3 = 1,2q$ (. 2,).
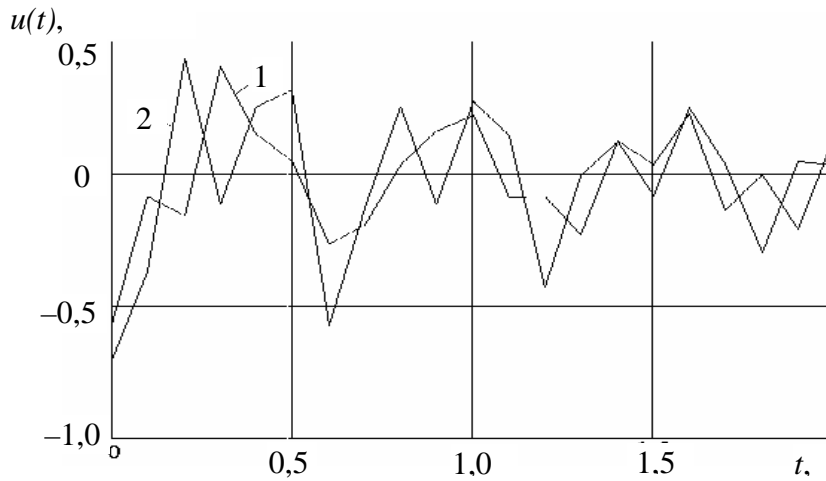
. 1. 1000 : *1 –*

$Q_1 = q, \ \ Q_2 = 1,4\,q, \ Q_3 = q$; *2 –* $Q_1 = 1,2q, \ Q_2 = q, \ Q_3 = 1,2q$

. 2, ,

(1,5)

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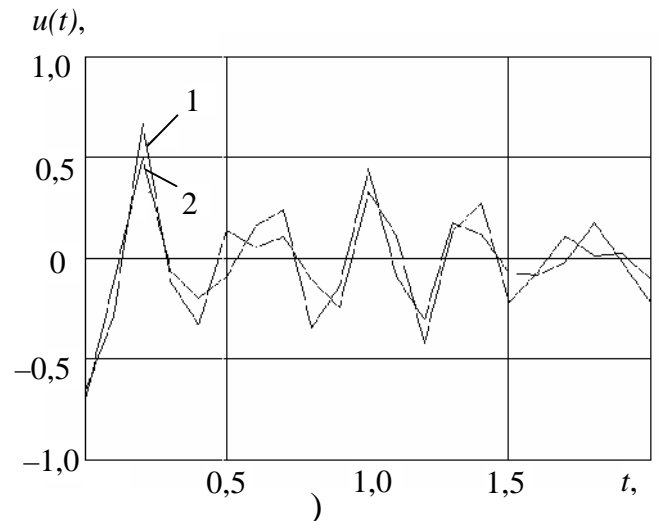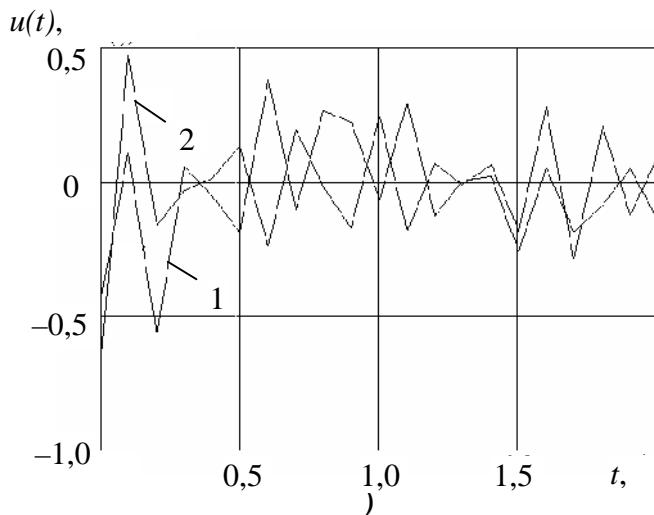
. 2. 1000

:) 1- – *1* – $Q_1 = q, \ Q_2 = 1,4\,q, \ \ Q_3 = q$; *2* –
$Q_1 = 1,2q, \ \ Q_2 = q, \ Q_3 = 1,2q$, $Q_1 = q, \ Q_2 = 1,4\,q, \ \ Q_3 = q$;) $Q_1 = q, \ Q_2 = 1,4\,q, \ Q_3 = q$;
2- – $Q_1 = 1,2q, \ Q_2 = q, \ Q_3 = 1,2q$

(. 2,)

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20…25 %,

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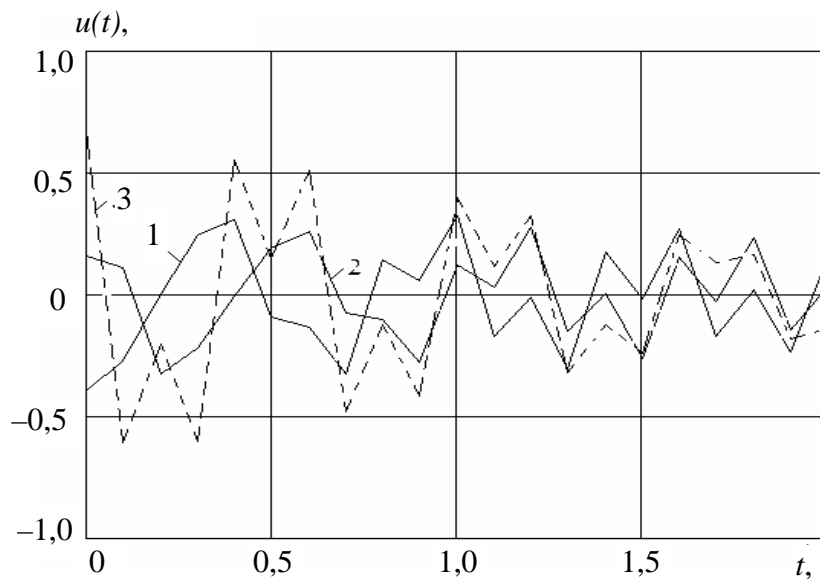
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:   «   »   40 %.

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:   *1* $\Delta t = 0,02$ с ,   *2* –

$\Delta t = 0,04$ с , *3* – $\Delta t = 0,065$ с .

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(*1*   *2*   )   ,

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(*3*)

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$\Delta t = 0,02$ с ; *2* – $\Delta t = 0,04$ с ; *3* – $\Delta t = 0,065$ с

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