

č č

4

č ě č ě
č ě
č

Ključne reči

The diagram illustrates a mechanical system consisting of two masses, \$m_1\$ and \$m_2\$, connected by two springs with stiffnesses \$c_1\$ and \$c_2\$. The displacement \$x_1\$ is measured from the equilibrium position of \$m_1\$, and the displacement \$x_2\$ is measured from the equilibrium position of \$m_2\$. The system is subject to external forces \$\Delta\$.

a) shows the physical system with two springs and two masses.

b) shows the system in state-space form, represented as a second-order differential equation:

$$\ddot{x} + \frac{c_1 + c_2}{m_1 + m_2} x = \frac{\Delta}{m_1 + m_2}$$

This can be written in matrix form as:

$$\ddot{\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}} + \begin{bmatrix} c_1 & 0 \\ 0 & c_2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} \Delta \\ 0 \end{bmatrix}$$

Comparing with the general form of a second-order system:

$$\ddot{x} + 2\zeta\omega_n x = \frac{\Delta}{m} \quad \text{and} \quad \ddot{x} + \frac{c}{m} x = \frac{\Delta}{m}$$

We find the natural frequency \$\omega_n\$ and damping ratio \$\zeta\$ as follows:

$$\omega_n = \sqrt{\frac{c_1 + c_2}{m_1 + m_2}} \quad \text{and} \quad \zeta = \frac{c_1 + c_2}{2\sqrt{(m_1 + m_2)(c_1 + c_2)}}$$

C

C

C

$$\omega \leq \{a \ a\} \quad \omega \geq \{a \ a\}$$

$$\beta =$$

$$\alpha \quad \beta \quad \epsilon$$

$$\begin{matrix} \check{c} \\ (\Delta) \\ \alpha \beta \end{matrix}$$

C

C

C

[]

$$\alpha = m \quad m \quad \beta = c \quad c$$

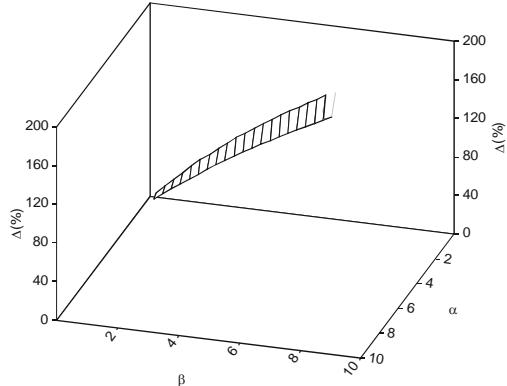
$$\begin{matrix} \check{c} & & \check{c} & & \check{c} \\ \alpha & \beta & \check{c} & \epsilon & \check{c} \\ \alpha & & \check{c} & \check{c} & \check{c} \\ \alpha & & \epsilon & \check{c} & \check{c} \\ \beta & & \alpha & \check{c} & \check{c} \\ \beta & & & \alpha & \check{c} \end{matrix}$$

$$\omega = a \left\{ -\frac{\beta}{\beta + } \left[\alpha + \beta + -\sqrt{\alpha + \beta + - \alpha \beta} \right] \right\}$$

$$\begin{matrix} \check{d} & \check{c} & \check{c} \\ & \check{c} \\ c & \rightarrow \infty \end{matrix}$$

$$\omega = \sqrt{\frac{c}{m + m}} = a \sqrt{\frac{\alpha \beta}{(\alpha +)(\beta +)}}$$

$$m =$$



$$\omega = \sqrt{\frac{c}{m}} = a \sqrt{\frac{\beta}{\beta + }}$$

C

$$c \rightarrow \infty$$

$$\omega = \sqrt{\frac{c}{m}} = a \sqrt{\frac{\alpha}{\beta + }}$$

$$m =$$

$$\omega = \sqrt{\frac{c c}{m (c + c)}} = a \sqrt{\frac{\alpha \beta}{(\beta +)}}$$

C

C

$$\Delta = f \alpha \beta = \frac{\omega - \omega}{\omega} = \left(\frac{\omega}{\omega} - \right)$$

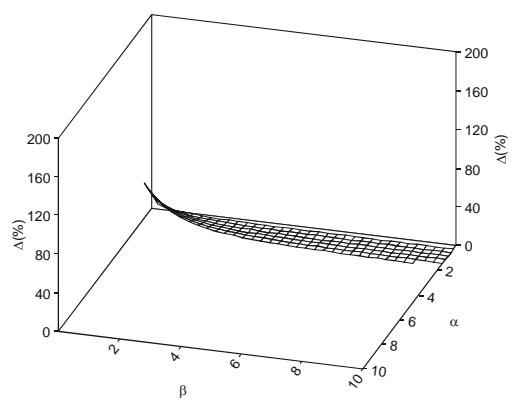
C

C

C

$$\alpha \beta$$

$$\alpha =$$



$\beta = c \quad c =$	$=$	\dot{c}	\ddot{c}
m	$[]$	c	(α)
c	m	α	(β)
β	\dot{c}	\dot{c}	\dot{c}
\ddot{c}	α	$\beta \approx$	\dot{c}
$[]$	\dot{c}	α	\dot{c}
\ddot{c}	$[]$	β	\dot{c}
\ddot{c}	\dot{c}	\ddot{c}	\ddot{c}

Č Č
 optimizacija dizalica Dinamika i
 - dinamika. . Kurs teoretycheskoj mekhaniki, II
 Vibratsii v tekhnike - kolebaniya linejnykh sistem. I, mashin.
 Dinamika gruzopod'emnykh Usiliya i nagruzki v dejstvuyushchikh mashinakh
 Dinamika i prochnost' odnokrovshovykh Dinamika i prochnost' odnokrovshovykh
 ehkskavatorov. Tehnika-Mašinstvo
d

Key words

Mots-clés:

