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                                                : q₁=X; q₂=Y; q₃=Z   O₁
                                        [3]: q₄=φ; q₅=ψ; q₆=θ.
                                                                                        [2]:

$$W = \frac{1}{2}m\left(\dot{X}^2 + \dot{Y}^2 + \dot{Z}^2\right) + \frac{1}{2}\left(\begin{array}{c}J_X\omega_X{}^2 + J_Y\omega_Y{}^2 + J_Z\omega_Z{}^2 - 2J_{XY}\omega_X\omega_Y - \\ -2J_{YZ}\omega_Y\omega_Z - 2J_{XZ}\omega_X\omega_Z\end{array}\right) \tag{1}$$

m –   ; J_X, J_Y, J_Z - X_1, Y_1, Z_1 -
                ; J_{XY}, J_{YZ}, J_{XZ} –
                                $O_1X_1Y_1Z_1$; -
    X_1, Y_1, Z_1,   .

                                                            ,
                        $\dot{q}_j$:

$$\omega_X = \dot{\phi} + \dot{\psi}\sin\theta;$$
$$\omega_Y = \dot{\psi}\cos\theta \cdot \cos\phi + \dot{\theta}\sin\phi; \tag{2}$$
$$\omega_Z = \dot{\theta}\cos\phi - \dot{\phi}\cos\theta \cdot \sin\phi.$$

            (2)   (1)

$$W = \frac{1}{2}\sum_{k=1}^{6}\sum_{l=1}^{6}A_{lk}(q_1, q_2, \ldots, q_6) \cdot \dot{q}_l\dot{q}_k. \tag{3}$$

                    II   :

$$\begin{cases} \dfrac{d}{dt}\left(\dfrac{\partial W}{\partial \dot{q}_n}\right) - \dfrac{\partial W}{\partial q_n} = Q_n \ , \\ n = 1,2,\ldots,6, \end{cases} \qquad (4)$$

Q_n – .

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, ,

X, Y, Z.

:

$$R_{jx} = -C_{jx}\delta_{jx} - \mu_{jx}\dot{\delta}_{jx};$$
$$R_{jy} = -C_{jy}\delta_{jy} - \mu_{jy}\dot{\delta}_{jy}; \qquad (5)$$
$$R_{jz} = -C_{jz}\delta_{jz} - \mu_{jz}\dot{\delta}_{jz},$$

δ_{jx}, δ_{jy}, δ_{jz} – ; j - ; C_{jx}, C_{jy}, C_{jz} – ; μ_{jx}, μ_{jy}, μ_{jz} – .

:

$$\delta_{jx} = X + Z_j\psi - Y_j\theta;$$
$$\delta_{jy} = Y + X_j\theta - Z_j\varphi; \qquad (6)$$
$$\delta_{jz} = Z + Y_j\varphi - X_j\psi;$$

X_j, Y_j, Z_j– $O_1X_1Y_1Z_1$.

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( ):

$$\overline{X} = \overline{A}_x \cdot e^{i\omega t}; \quad \overline{Y} = \overline{A}_y \cdot e^{i\omega t}; \quad \overline{Z} = \overline{A}_z \cdot e^{i\omega t};$$
$$\overline{\varphi} = \overline{A}_\varphi \cdot e^{i\omega t}; \quad \overline{\psi} = \overline{A}_\psi \cdot e^{i\omega t}; \quad \overline{\theta} = \overline{A}_\theta \cdot e^{i\omega t}, \qquad (7)$$

i – , ω - .

(7) (6), , $\dot{\overline{q}}_n = i\omega\overline{q}_n$, :
$$\overline{R}_{jx} = -\overline{C}_{jx}\left(\overline{X} + Z_j\overline{\psi} - Y_j\overline{\theta}\right);$$
$$\overline{R}_{jy} = -\overline{C}_{jy}\left(\overline{Y} + X_j\overline{\theta} - Z_j\overline{\varphi}\right); \qquad (8)$$
$$\overline{R}_{jz} = -\overline{C}_{jz}\left(\overline{Z} + Y\overline{\varphi} - X_j\overline{\psi}\right);$$

$\overline{C}_{jx}$, $\overline{C}_{jy}$, $\overline{C}_{jz}$ – , -
:

$$\overline{C}_{jx} = C_{jx}\left(1+i\frac{\mu_{ix}\omega}{C_{jx}}\right);$$

$$\overline{C}_{jy} = C_{jy}\left(1+i\frac{\mu_{iy}\omega}{C_{jy}}\right); \tag{9}$$

$$\overline{C}_{jz} = C_{jz}\left(1+i\frac{\mu_{iz}\omega}{C_{jz}}\right)$$

Q_1, Q_2, Q_3

X, Y, Z.   (8)   ,   -

:

$$\overline{Q}_1 = -\left(\overline{C}_{11}\overline{X} + \overline{C}_{15}\overline{\psi} + \overline{C}_{16}\overline{\theta}\right) + \overline{F}_x(t);$$
$$\overline{Q}_2 = -\left(\overline{C}_{22}\overline{Y} + \overline{C}_{24}\overline{\varphi} + \overline{C}_{26}\overline{\theta}\right) + \overline{F}_y(t); \tag{10}$$
$$\overline{Q}_3 = -\left(\overline{C}_{33}\overline{Z} + \overline{C}_{34}\overline{\varphi} + \overline{C}_{35}\overline{\psi}\right) + \overline{F}_z(t),$$

$\overline{C}_{lk}$ –   ; $\overline{F}_x$, $\overline{F}_y$, $\overline{F}_z$ –

X, Y, Z.

$\overline{C}_{lk}$ -

:

$$\overline{C}_{11} = \sum_{j=1}^{N}\overline{C}_{jx};\quad \overline{C}_{22} = \sum_{j=1}^{N}\overline{C}_{jy};\quad \overline{C}_{33} = \sum_{j=1}^{N}\overline{C}_{jz};$$

$$\overline{C}_{44} = \sum_{j=1}^{N}\left(\overline{C}_{jz}Y_j^2 + \overline{C}_{jy}Z_j^2\right);\quad \overline{C}_{55} = \sum_{j=1}^{N}\left(\overline{C}_{jx}Z_j^2 + \overline{C}_{jz}X_j^2\right);$$

$$\overline{C}_{66} = \sum_{j=1}^{N}\left(\overline{C}_{jx}Y_j^2 + \overline{C}_{jy}X_j^2\right);\quad \overline{C}_{15} = \sum_{j=1}^{N}\overline{C}_{jx}Z_j;$$

$$\overline{C}_{16} = -\sum_{j=1}^{N}\overline{C}_{jx}Y_j;\quad \overline{C}_{24} = -\sum_{j=1}^{N}\overline{C}_{jy}Z_j; \tag{11}$$

$$\overline{C}_{26} = \sum_{j=1}^{N}\overline{C}_{jy}X_j;\quad \overline{C}_{34} = \sum_{j=1}^{N}\overline{C}_{jz}Y_j;$$

$$\overline{C}_{35} = -\sum_{j=1}^{N}\overline{C}_{jz}X_j;\quad \overline{C}_{45} = -\sum_{j=1}^{N}\overline{C}_{jz}\cdot X_j\cdot Y_j;$$

$$\overline{C}_{46} = -\sum_{j=1}^{N}\overline{C}_{jy}\cdot X_j\cdot Z_j;\quad \overline{C}_{56} = -\sum_{j=1}^{N}\overline{C}_{jx}\cdot Y_j\cdot Z_j.$$

N –   ,   .

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:

$$a_{11}\ddot{X} + \overline{C}_{11} \cdot \overline{X} + \overline{C}_{15} \cdot \overline{\psi} + \overline{C}_{16} \cdot \overline{\theta} = \overline{F}_x(t);$$

$$a_{22}\ddot{Y} + \overline{C}_{22} \cdot \overline{Y} + \overline{C}_{24} \cdot \overline{\varphi} + \overline{C}_{26} \cdot \overline{\theta} = \overline{F}_y(t);$$

$$a_{33}\ddot{Z} + \overline{C}_{33} \cdot \overline{Z} + \overline{C}_{34} \cdot \overline{\varphi} + \overline{C}_{35} \cdot \overline{\psi} = \overline{F}_z(t);$$

$$a_{44}\ddot{\varphi} + a_{45}\ddot{\psi} + a_{46}\ddot{\theta} + \overline{C}_{24} \cdot \overline{Y} + \overline{C}_{34} \cdot \overline{Z} + \overline{C}_{44} \cdot \overline{\varphi} + \overline{C}_{45} \cdot \overline{\psi} + \overline{C}_{46} \cdot \overline{\theta} = \overline{M}_x(t);$$

$$a_{45}\ddot{\varphi} + a_{55}\ddot{\psi} + a_{56}\ddot{\theta} + \overline{C}_{15} \cdot \overline{X} + \overline{C}_{35} \cdot \overline{Z} + \overline{C}_{45} \cdot \overline{\varphi} + \overline{C}_{55} \cdot \overline{\psi} + \overline{C}_{56} \cdot \overline{\theta} = \overline{M}_y(t);$$

$$a_{46}\ddot{\varphi} + a_{56}\ddot{\psi} + a_{66}\ddot{\theta} + \overline{C}_{16} \cdot \overline{X} + \overline{C}_{26} \cdot \overline{Y} + \overline{C}_{46} \cdot \overline{\varphi} + \overline{C}_{56} \cdot \overline{\psi} + \overline{C}_{66} \cdot \overline{\theta} = \overline{M}_z(t).$$

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V.N. Smolij
**SUBSYSTEMS OF THE SYSTEM OF SUPPORT
OF DECISION-MAKING THE AUTOMATED
MANAGEMENT BY DESIGNER
PREPARATION OF PRODUCTION
OF ELECTRONIC VEHICLES
IN PRODUCTION OF MACHINES**

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The subsystems of the SSDM automated management by designer preparation in production of machines are offered productions, including the choice of types of objects and construction models of electronic vehicle, arrangements engulfing stages, and constructing, preparations of production and tests of electronic vehicle. The examined subsystems support intercommunication with the experimental setting by the proper rigging and allow to obtain failing information about the object of designer preparation of production and to estimate his parameters and arrangement without the issue of pre-production model of good.

Keywords: *production of machines, management subsystems, process of production, electronic vehicle, system of support of decision-making, productivity of process of production, mathematical models.*