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In Article analytycheskoe of the study process conducted Sorting potatoes on the surface kartofelesortyrovky with building a Mathematical models Rabocheye sortyrovanyya process.

Kartofelesortyrovka, sortyrovanye, club potatoes.

There are described in paper the results of analytic research of potatoes sorting as mathematical model.

Potatoes sorter, sorting, potatoes tuber.

UDC
621.87

STABILITY OF DYNAMIC VIZOK-LOAD FOR OPTIMAL DYNAMICHNONOHO motion mode

VS Loveykin, PhD OH Shevchuk, MA

The paper investigates the stability of dynamic systems vizok- load for optimal dynamic motion mode by changing the frequency of natural oscillations of the system and the ratio between the masses and cargo carriage. Areas of the values of these parameters that give effect to the best mode for dynamic motion criterion. The results show graphics solution dependencies.

Truck, load, vibrations, optimal mode, dynamic stability.

Resolutionska problem. PEid driving crane trolley load oscillations occur, reducing the productivity of transfer operations. In addition to transient conditions trolley movement (starting, braking) are dynamic loads acting on the details of the mechanism and metal faucet and affect his life. These load with load fluctuations reduce the reliability of the machine and lead to premature failure mechanisms and tired crane collapse crane metal [1-6].

AnaLease Finalnnih lit.idzhen. Dla A reductiontion dinanomic loads and load using the fluctuations Program motion hoisting machines [8-10]. Modes of motion determined by variational methods [7] for the adopted criteria optimization.

Andk in [8] described classification criteria optimization cranes as dynamic systems. There are given recommendationtions regarding the use of criteria for a particular countrynew mechanism and mode of operation.

The method of solving the optimization problem by direct variational method which allows to take into account requirements that relate to the motion of mechanical modes odnomasovyh systems and found that improving the smoothness of the system affects the value of the criterion in [9].

The paper [10] a way to reduce fluctuations in load on flexible suspension mechanism at work turning the crane boom during the transition process by optimizing the start-up and braking mode for dynamic criterion.

In the above works variational problems solved by the fluctuations of load and reduce dynamic loads in mechanisms during the transitional regimes for specific traffic couplemeters of lifting equipment.

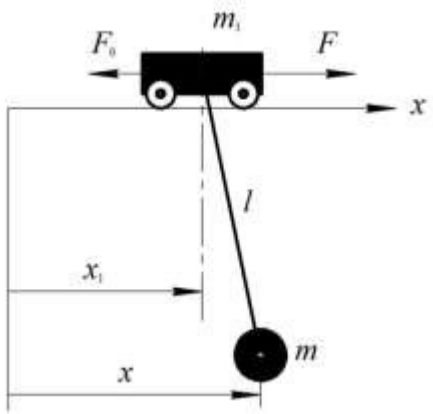
Prote impact of parameters on the optimal mode of movement in these jobs are not considered.

Metand research - Investigate the impact of parameters such as the ratio between the masses and the trolley load and frequency of natural oscillations on the stability of the dynamic system cart-load for optimal dynamic motion mode during start-up.

Rezultaty dperssurvey findings. Dll optimizatsiyi fromand didynamically CRITERIAm cockself- moHCCand from gnuchkym Sectionidvisom toandntazhu selected dvomasova dynamic model, which is shown in Fig. 1 [10]. She consists of a mass of trolley m_1And a mass m_2Suspended on flexible suspension length l. On the truck are the driving force F and efforts static resistance F_0. We believe that the rope neroztyazhnyy, weightless and completely flexible load is concentrated at one point, load fluctuations are small and occur only in the plane of movement of the trolley. The weight of the drive mechanism is reduced to a mass of the trolley and concentrated at its center of mass. Elasticity elements driving mechanism is neglected because of their frequency oscillations about an order of magnitude larger than the oscillation frequency and load fluctuations do not affect the latter. Based on the Lagrange equation of the second kind is composed equation of motion of the system:

$$\begin{cases} m_1\ddot{x}_1 = F - \dfrac{mg}{l}(x_1 - x) - F_0; \\ \ddot{x} = \dfrac{g}{l}(x_1 - x) \end{cases} \qquad (1)$$

where lazinessandor coordinates the movement of goods and carts; x, x_1 – g – ataccelerationdue to gravity.



Ric. 1. Dvomasova dynamic model trolley. From the

second equation of (1) we can write:

$$x_1 = x + \frac{l}{g}\ddot{x}; \quad \dot{x}_1 = \dot{x} + \frac{l}{g}\dddot{x}; \quad \ddot{x}_1 = \ddot{x} + \frac{l}{g}x^{IV}. \qquad (2)$$

By criterionth optimizatsiyi Acceptabout minimizationzatsuw middle from-identification "energy" acceleration during acceleration crane trolley [11]

$$I_V = \frac{1}{t}\int_{10}^{t_1} V dt \to \min, \qquad (3)$$

where t_1 – time; t – TrivimiLiszt movement; V – "Enerhiya "acceleration [12].

DA dynamic model of the selected write the expression for the "energy" acceleration:

$$V = \frac{1}{2} m\dot{x}^2 + \frac{1}{2} m\dot{x}^2 = \frac{1}{2} m(\ddot{x} + \frac{l}{g} x^{IV})^2 + \frac{1}{2} m\dot{x}^2. \qquad (4)$$

Condition of minimum criterion (3) is a Poisson equation [7]:

$$\frac{\partial V}{\partial x} - \frac{d}{dt}\frac{\partial V}{\partial \dot{x}} + \frac{d^2}{dt^2}\frac{\partial V}{\partial \ddot{x}} - \frac{d^3}{dt^3}\frac{\partial V}{\partial \dddot{x}} + \frac{d^4}{dt^4}\frac{\partial V}{\partial x^{IV}} = 0. \qquad (5)$$

Pislya substitution of expression (4) in condition (5) becomes:

$$m\frac{l^2}{g^2} x^{VII} + 2m\frac{l}{g} x^{VI} + (m_1 + m) x^{IV} = 0. \qquad (6)$$

Rosedivide all members of equation (6) by a factor of about older FSUsidnoyi and make replacement $\frac{g}{l} = k^2$ tan $\frac{m}{m_1} = m$ Then we get:

$$x^{VIII} + 2k^2 x^{VI} + (1+m)k^4 x^{IV} = 0, \qquad (7)$$

where k – Chastota natural oscillations of the system; m – weight ratio mass load to the cart.

RoseKnitting pivnyannya(7) dlI dandLeancă puUWC fromand such InitialWash and trailer driving conditions:

$$t = 0: x = 0; x_1 = 0; \dot{x} = 0; \dot{x}_1 = 0; \quad t = t_1: \dot{x} = v; \dot{x}_1 = v; \ddot{x} = 0; \ddot{x}_1 = 0. \qquad (8)$$

Rewritemo motion boundary conditions (8) with regard to (2):

$$t = 0: x = 0; \dot{x} = 0; \ddot{x} = 0; \dddot{x} = 0; \quad t = t_1: \dot{x} = v; \ddot{x} = 0; \dddot{x} = 0; x^{IV} = 0. \qquad (9)$$

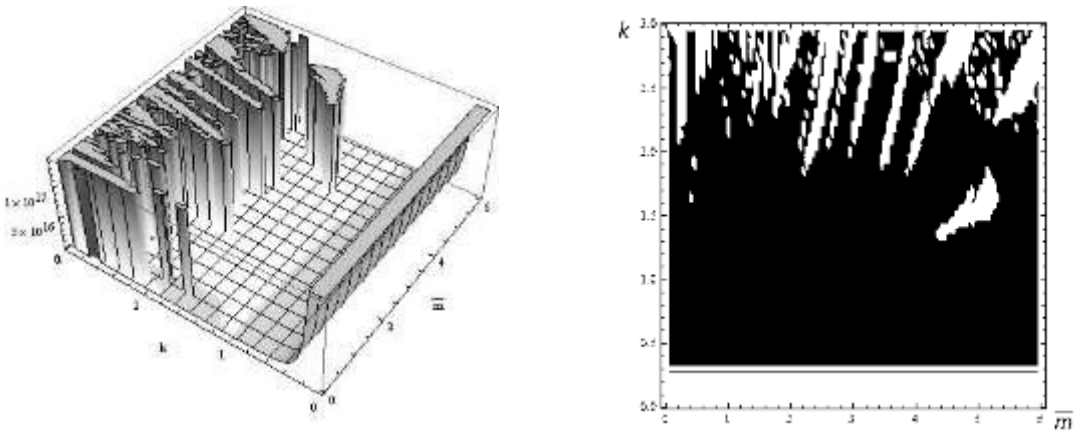
Rosebinding equation (7) with the following parameters of the system:

$$t_1 = 3 with; v = 0{,}5\ m/with; g = 9{,}8\ m/with^2; \qquad (10)$$

Constructmo diahramin meansHb Focusingionalu (3) prand piznyh from-identification parameters k and m.

To Chorit aboutoblast (Figure. 3,to) significanceof functionalpersonnel of I_V findbe in the range from fifth to sixth order, and the white - from the

fourteenth to the twenty-first, ie combinations
couplem $k$tand$m$vchorniy region is provided by optimizing crane trolley with flexible suspension load the parameters (10). We show two examples of parameter values k,m
tand (Table)..I havefor example, can be seen at first with little change
I_V
the ratio between the masses and the trolley load at a constant natural frequency of oscillation system $k$from-identification functionality is increasing dramatically. In the second example also functional significance increases with little change in the parameter $k$tand constant m.



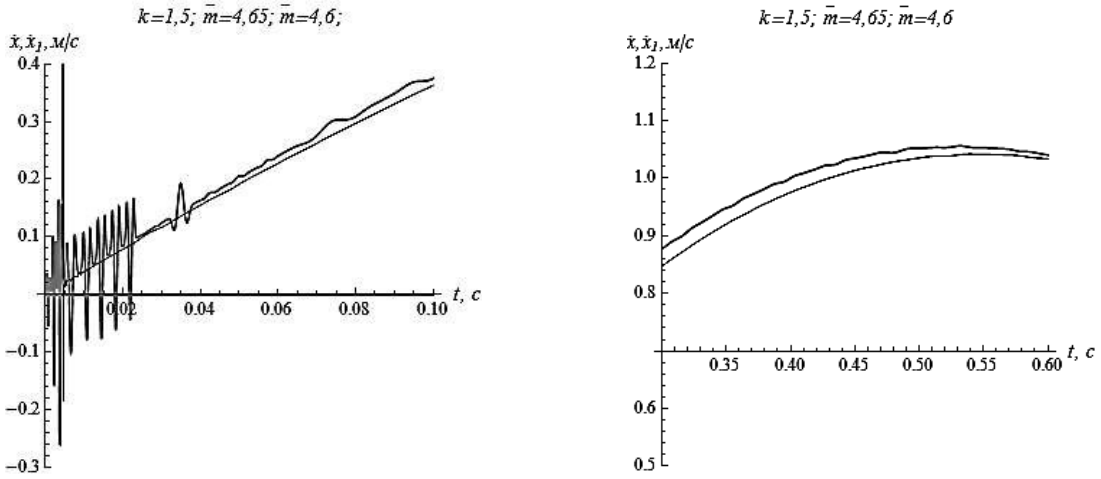
and) to)

Ric. 2. Diahrama fromrequired set parameters, prand Wormsx available optimizatsiya (a); (B) section diagram of the plane $k\,m$.

Prickfrets parameter values k, m ***tand*** I_V.

Example	m	k	IV
1	an 4.6	1.5	59672.9
	to 4.65	1.5	$5.66834 \cdot 1021$
2	an 1.7	1.05	230 713
	to 1.7	1	2.53425 ·1014

Constructmo graphics speed trolley using the parameters listed in the table for the first example.



and) to)

Ric. Figure 3. The change of speed truck.

From the graph shows uneven speed of the trolley at the beginning of the movement (0-0,02 period c) observed reverse movement trolley that goes forward in uneven (Fig. 3, a), uneven movement of the trolley decrease over time but continues

againsttion entire period of motion (Fig. 3, B). While at the values of parameters Example 1b (Table.) Kept uniform motion.

Conclusion. Theoreticalneither daboutslidzhennya withtiykosti parameters countryNew trolley with flexible suspension load as a dynamic system with optimal dynamic mode motion showed that there are areas of parameter values $k$tand$m$Where optimization for dynamic criterion does not give the desired result. To address these shortcomings should be set to the speed of the trolley and the established period of acceleration in accordance with the natural oscillation frequency and mass trolley crane and cargo, which makes it possible to increase the reliability of the cranes with flexible suspension cargo.

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In Article Influence of research sobstvennыh frequency oscillations and sootnoshenye Between Mass and trolley of cargo on optymalnыy Dynamic mode motion. Opredelenы

regionэtyh parameters and values obespechyvayuschyh Implementation optimal mode of motion on Dynamic Criteria. Showing Results solutions hrafycheskymy dependence.

Cart, Cargo, fluctuations, optymalnыy mode Stability parameters.

These papers investigate impact of natural oscillations frequency and ratio between masses of trolley and load optimal dynamic motion. Areas of these parameters values which support optimal mode of motion for dynamic criteria. The results are shown graphically.

***Trolley, cargo, oscillations, optimal mode, parameters stability**.*

UDC:
631,356,262

MatATYCHNA MODEL contaminant separation process intensification FROM root vegetables

VM Baranowski, PhD Ternopil National Technical University named after Ivan Pul'uj

The method of developing deterministic mathematical models describing contaminant separation process intensification heap of root crops combined working bodies of transport and technological systems adapted root crop machinery.

Woroch root process, flow, input supply, components impurities differential equation.

Resolutionska problem. Barelyvnym criterion further intensification of the modern development of agricultural production is the material base of mechanization of production processes based software design and implementation of highly efficient energy-saving technology products harvesting crops [1].

The technological process of production of root crops, such as sugar, feed, table beets and carrots, which are valuable raw materials, feed and food crops, one of the
most labor-intensive operations are mechanized harvesting, which accounts for about 25 ... 40% of labor costs.