dolzhna byt ee vhozhdenye in The International scientific-technical flows, kotoryya permit modernyzyrovat Patriotic Production, obespechyt major industry competitiveness industry.

Scientometrics, The International bazы data, otsenki quality education, Khirsha index, ympakt factor, nauchnыe Studies, Integration, ynformatsyonnoe space.

This paper contains convincing arguments about the need to measure quality and efficiency of research. The possibilities scientometrics and its tools. In the current context of globalization of economic life developed countries where science serves as the main factor of economic reproduction, pursue their development through the improvement of existing technologies, techniques and use of innovative scientific achievements. International technological and scientific exchange, transfer of intellectual potential - one of the signs of our time. It is clear that Ukraine will become prosperous only when it can comprehensively and efficiently learn to take advantage of the territory and resources owned. But this is not possible without close economic and technological cooperation with developed countries. Therefore, the strategic goal for Ukraine to be its entry into the international scientific streams that will modernize domestic production, to ensure the competitiveness of basic industries.

Scientometrics, international database of education quality evaluation, Hirsch index, impact factor, research, integration, information space.

UDC 631,316

Conceptual framework MECHANICS STUDY OF INTERACTION BETWEEN WORKING elastic suspension from soil

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A concept study of mechanics and mechanisms of interaction of working on an elastic suspension of the ground.

Concept, research, mechanics, machinery, interaction, elastic suspension, soil.

Formulation of the problem. It is known [1] that one way to improve the quality of tillage implements and reducing the energy

intensity of cultivation is to create structures of elastic mechanisms established between the working body and frame machines (elastic mechanisms - elastic suspension). Such mechanisms contributing to the work of samozbudzhuyuchyh fluctuations, which in turn improves the cleaning of the working bodies of overhanging plant debris and soil, and reduces traction resistance. The effect of self-excitation of oscillations can be widely used in many industrial processes agricultural mechanics. Currently, manufacturers of tillage machines widely used idea. However, today there is not enough depth analysis and method of calculation of such mechanisms. Most designers like mechanical systems considered only as a safety device, not as a source of periodic self-excitation of nonlinear oscillations.

The purpose of research is to develop a concept study mechanics and mechanisms of interaction of working on an elastic suspension of the ground.

Analysis of recent research. Elastic mechanisms commonly used in three ways: 1) three-tier mechanism with one elastic element; 2) p'yatylankovyy one elastic element 3) resistant or resilient elastic suspension elements.

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Analysis of elastic mechanisms shown [1] that, despite the wide range of design solutions, they all have nonlinear stiffness (in literature called essentially nonlinear mechanical systems [2]).

Research stiffness characteristics [3, 4] showed that graphics power characteristics of all these systems are non-linear dependence of nonlinear elastic force of generalized coordinates (- for one-dimensional problems) (Fig. 1).$F_q qq \equiv x$

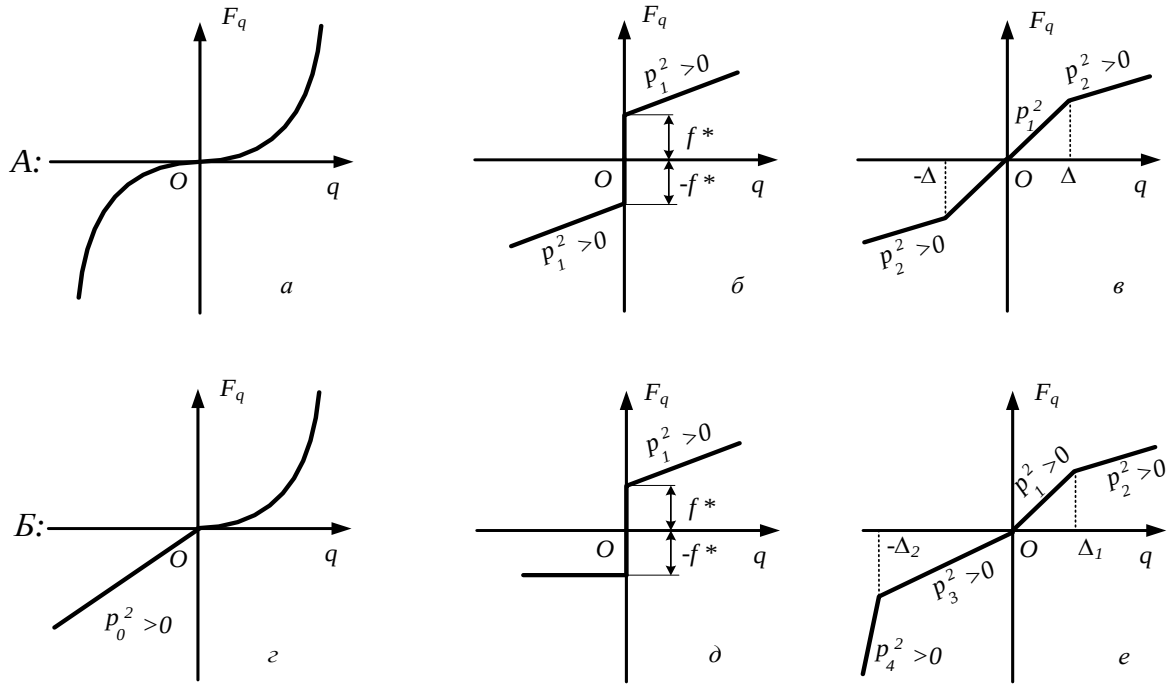

Fig. 1. Some options nonlinear characteristics regenerative power: A - symmetrical - a) polynomial; b) piecewise linear (of tension); c) piecewise linear elastic. B - asymmetric - d) polynomial; d) with tension; e) piecewise linear elastic.$\mathrm{F_q} = \mathrm{f(q)}$

Fig. 1: - offset (right and left of the equilibrium); - Tightening system at j and region; - The value of tension; $\Delta_i i = \overline{(1,2)} p_j^2 j = \overline{(1,4)} \pm f^* p_0^2$ - Linear stiffness.

However, this does not end the source of nonlinearity in the formulation of problems of mechanics of interaction of working on an elastic suspension with the work environment. There are also non-linearity following sources: 1) connected to the working body mass of soil (variable over time t); 2) nonlinear friction (viscosity) of the medium (Fig. 2); 3) design features of the sample.

All these reasons make difficulties in setting problems of mechanics and analysis mechanisms (physical) interaction of working with an elastic suspension of the ground. Own nonlinear oscillations have a wide range of specific effects and mechanical effects, the use of which in manufacturing processes provides a significant technological and energy efficiency.

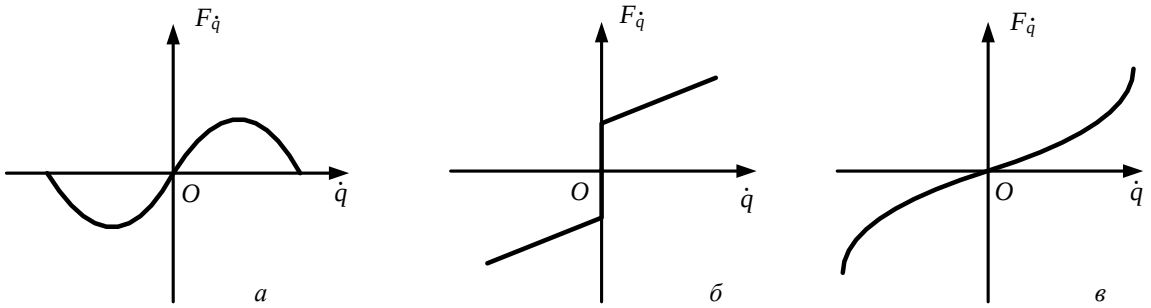

Fig. 2. Some options nonlinear characteristic viscosity (friction) - dissipative forces in the case of: a) the type of sinusoidal; b) piecewise linear with tension; c) polynomial type.$\mathrm{R(x,\dot{x})F_q = f(\dot{q}), \dot{q} \equiv \frac{dq}{dt}}$

Results. In the study of oscillatory processes occurring in the working bodies on an elastic suspension that interact with soil, can be divided into three main forces that determine the behavior of dynamic systems: 1) elastic recovery; 2) dissipative; 3) disturbing force. In this approach, the equations of motion oscillatory system with one degree of freedom can be written as:

$$m\ddot{x} + f(x) + R(x, \dot{x}) = H(t), \qquad (1)$$

where: - generalized coordinate (eg, linear or angular) - Mass or moment of inertia; -pruzhna Revitalizer force (elastic properties); - Power dissipation (dissipative characteristics) (Fig. 2); - Periodic external action (forced power) period T.$xmf(x)R(x,\dot{x})H(t)$

All the forces in equation (1) is a generalized force. If generalized angular coordinates are then terms in (1) are the moments.

The system of nonlinear elastic characteristic of renewable power complex dynamics observed. Depending on the initial conditions at the same parameters of the system (1) may have several different stable periodic mode with a period as driving force (T), and with multiple periods. This is bahatorezhymnist is the main feature of nonlinear systems. She, like other forms of non-linearity is determined, above all, a kind of elastic properties (1). In this paper we consider not quasi-linear system [5] and substantially-linear [2] in the sense that the nonlinear elastic restoring force characteristics can be any piecewise continuous function of the variable. In a nonlinear system as compared to linear, with the increase in the number of periodic modes may cause a larger number of high-profile bands, which develop oscillations with a frequency of involuntary force, as well as other more high or low frequencies.$f(x)x$

We note two properties of systems with nonlinear elastic characteristics: 1) the possibility of periodic self-excitation regime, during which period different from perturbing forces, ie the T, and stable treatment period of disturbing forces may be absent; 2) appearance

under certain conditions specific stochastic behavior of the system, despite the deterministic nature of the original equation (v. BC. Dynamical chaos).$H(t)$

So, for nonlinear systems, as opposed to linear, characterized by the following features: a) bahatorezhymnist fundamental and subharmonic modes; b) additional resonance frequency ranges; c) self-excitation of periodic oscillations; d) specific stochastic oscillations (dynamic chaos in which the system becomes unmanageable outside).

The role of certain forces in equation (1) and the initial conditions for the formation of periodic modes in a system that is treated by the nonlinear renewable discussed below.

First, list the main factors influencing the formation of periodic modes: 1) internal vibrational properties; 2) external disturbing force; 3) inelastic resistance forces (dissipative forces); 4) the initial conditions.

Internal vibrational properties. Nonlinear effects in oscillatory systems is a manifestation of internal vibrational properties of the system. Depending on the parameters of the influence and power dissipation internal vibrational properties due to elastic restoring forces can appear stronger or weaker, but the main features of oscillatory processes in nonlinear system (1) defines its main part, that nedyssypatyvnoy autonomous system with its free oscillations:

$$\ddot{x} + f(x) = 0. \quad (2)$$

This free oscillations characterize internal oscillatory properties of nonlinear system for which period and the spectral composition of free oscillations depending on the initial conditions. Available nonlinear oscillations is neharmonichnymy and contribution of individual harmonics in the expansion of free oscillations in the Fourier series for different elastic characteristics can vary widely.$f(x)$

If now to the main system (2) attach a small periodic perturbing force and low power dissipation, in such a system can be observed one or more stable periodic regimes. However, all these regimes tend to be close to the corresponding free oscillations of the main system.$H(t)R(x,\dot{x})$

In turn, the parameters of free oscillations of the system (2) determined the elastic characteristic or kvazipruzhnoyu restoring force. It is known that the elastic properties$f(x)f(x)$ at the appropriate scale to express the relationship between renewable power and variable, but the main characteristic is its free oscillation amplitude and frequency dependence, graphic images which are called "skeletal curve." Fig. 3 shows three elastic characteristics and their skeletal curves (solid line) of the systems with one degree of freedom. For symmetric elastic characteristics. For asymmetric maximum deviation for free oscillations typically characterized as skeletal curve for maximum

displacement$xf(x)f(x) = -f(-x)f(x)a_1(a_1 > 0)$ and built on either side of the horizontal axis. For small periodic perturbing forces amplitude-frequency curves (frequency response) marked with dashed lines in Fig. 3, close to the skeletal curves, which explains the name of the latter.$a_2(a_2 < 0)$

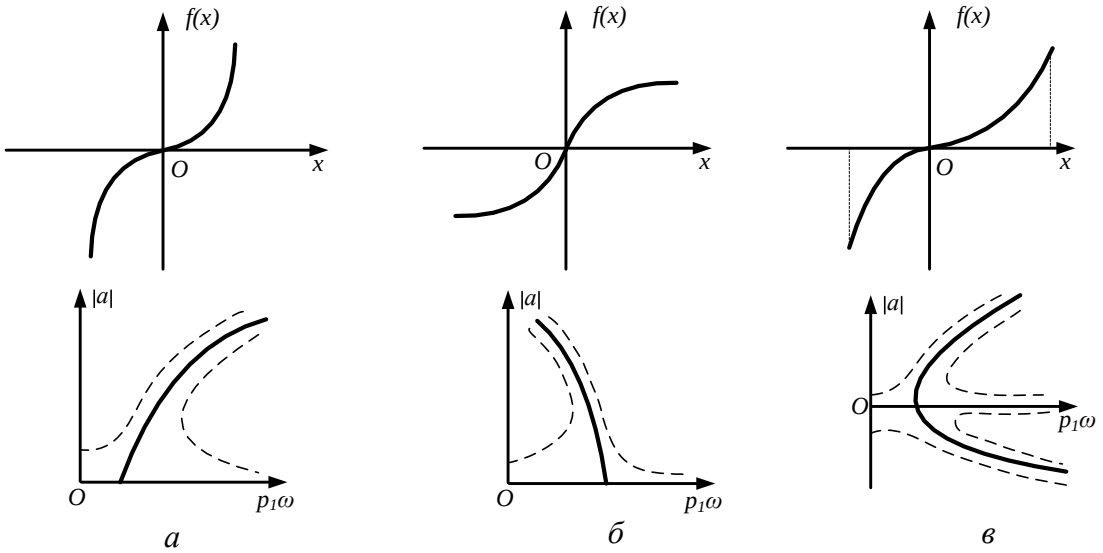

Fig. 3. The elastic characteristics curves and skeletal systems with one degree of freedom: a), b) symmetrical; c) asymmetrical.$f(x)f(x)$

External disturbing force. The main role of external disturbing forces (or periodic pulses) in the formation of periodic modes in nonlinear systems is to maintain a system of free oscillations with a period equal multiples, fractional period of force strength.

The qualitative behavior of nonlinear dynamical systems (ie the number and type of possible periodic regimes that have the same basic part (2) and under the influence of different pulsed or continuous external forces equal if different kinds of external influences have the same symmetry properties, that belong to one of five groups listed in [2]).$H(t)$

The forces of inelastic resistance (dissipative force). Different types of dissipative forces (Fig. 2) in most settlement schemes can be considered significantly less elastic. However, their impact on the quality oscillatory process is often the same. At low power inelastic resistance to possible quantitative calculation based on replacing the linear equivalent force [6, 7]. In this case, when the dissipative forces spivvymirni with elastic that is associated with a significant energy dissipation in the oscillatory system and usually with increasing dynamic forces at steady state, the nature of these forces should be considered more fully. The law changes the coordinate system may include rest areas (congestion) and other features, depending on the type of dissipative forces.

The role of dissipative forces in the formation of periodic oscillations in nonlinear systems generally is that they are to some extent "choke" the emergence of internal vibrational properties of the system. With increasing power dissipation and maximum deviation of dynamic loads in structures can, as declining (in high profile areas) and grow. So when the question arises of rational choice, these features should be considered.

In the non-resonant frequency ranges small dissipative forces do not lead to any significant changes in the periodic quantitative laws of motion compared with the laws of motion in nedysypatyvniy system. Small dissipative forces also tend to not shift the resonant frequency. In this regard, in determining the resonant frequency bands, as well as fluctuations in the calculation of non-resonant zones, these forces can not be ignored. It should highlight the impact on sub-dissipative forces and superharmonichni modes. It is believed that a small dissipation resulting in the death subharmonic modes. But this is true only in cases where subharmonic modes have small area attraction and therefore small margin stability. Most subharmonic modes with large areas of attraction are possible at sufficiently high dissipation and samozbudzhuyuchi subharmonic modes can be at very large dissipative forces. In nonlinear systems dissipative forces on superharmonichni modes affect less than subharmonic. Typically, and at considerable dissipation superharmonichnyy nature of the relevant laws of motion resonance zones remains for systems with one, and with several degrees of freedom.

The initial conditions. Internal and external oscillatory properties characterize the effect of the possibility of manifestation of nonlinear systems in various periodicals modes. Which of these arrangements will be implemented in reality depends on the initial state of the system. For non-autonomous systems with one degree of freedom initial state is characterized by three numbers x_0, $\dot{x}_0$ and t_0Called initial values. The initial state can be set as initial conditions and.$x(t_0) = x_0 \dot{x}(t_0) = \dot{x}_0$

In a system with n degrees of freedom is determined by the initial state () - initial values, which include n - initial values of phase coordinates, n - the initial value of the phase velocity and the initial value of time. Thus, the initial state of the system can be characterized in the extended phase space () - dimensional vector. It should be noted that the initial value only phase coordinates and velocities can not uniquely determine the initial state of the system, ie with the same meaning and different values of time possible to implement different regimes. Initial phase coordinates describing the initial phase of external action, and therefore setting the initial value is significant.$2n + 1 x_{n0} \dot{x}_{n0} t_0 2n + 1 X_0(x_{n0},\ \dot{x}_{n0},\ t_0) x_0 \dot{x}_0 t_0 t_0 t_0$

Conclusions

The system of nonlinear elastic characteristic of renewable power complex dynamics observed. Depending on the initial conditions at the same parameters of the system (1) may have several different stable periodic mode with a period as driving force (T), and with multiple periods. This is bahatorezhymnist is the main feature of nonlinear systems. She, like other forms of non-linearity is determined, above all, kind of elastic characteristics.$f(x)$

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The results can be used to refine and improve existing methods for engineering calculations oscillating mechanical systems.

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Concept proposals for the study of mechanics and mechanisms of interaction workers to upruhoy podveske bodies with soil.

Concept, Studies, Mechanics, Mechanisms, Interaction, upruhaya podveska, soil.

In paper was proposed the concept of study the mechanics and mechanisms of interaction of vibrational tillage tools with the soil.

Concept, research, mechanical, mechanisms, interaction, elastic suspension, soil.

UDC 631,311: 621,891

STATE AND PROSPECTS FOR STRENGTHENING AND REPAIR OF AGRICULTURAL MACHINES WORKING IN UKRAINE

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A. Opalchuk, PhD

The article given analytical review of existing methods of strengthening and restoration work of agricultural machinery, are the types of wear parts and components; Proposals production.

Working bodies tillage machines, abrasive wear, disc harrows paw cultivator, plow ploughshare.

Formulation of the problem. Techno-economic performance of many agricultural machines still very low due to the small length of service of their workers and forced outages

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at the last periodic replacement, which requires a significant investment of funds for repairs and spare parts. In particular this applies tillage implements, operating agencies which operate in difficult field conditions at considerable stress, shock, vibration, warps. Rapid wear blades plowshares, paws cultivators and disc harrows reduces the productivity of units and the quality of performance and, ultimately, to increase the cost of agricultural products. In southern Ukraine paws dry areas and cultivators Ploughshares have to repair or replace thatchanges. Thus on sandy soil worn details 8-10 times faster than clay. Ploughshare plow is one of the most wear working bodies. The main reason - the rapid abrasive wear caused by the interaction of solid (NV 8-11 GPa) mineral particles contained in the soil .. At the present time for the main cultivation - plowing used parts of the job, structural parameters were designed 40 ... 50 years back. Given that to date has significantly increased the mass harvesting machines, which led to an increase in the density of the soil, the load on the working bodies of arable units increased about 4 times, although the working