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In Article Present methods of modeling fluctuations polevoy Informational mashiny with systemoy tehnycheskoho of view in motion by nerovnostyam surface field. Installed the degree of influence konstruktyvnыh parameters, elastic and dempfernыh elements podvesky polevoy Informational mashiny on Stabilization system tehnycheskoho In accordance of view requirements.

Tochnoe zemledelye, fluctuations Machines, system tehnycheskoho of view, zhestkost podvesky.

In paper resulted method of design of vibrations of field informative machine with system of technical sight at motion to inequalities of surface of field. The degree of influencing of structural parameters is set, resilient and damper elements of pendant of field informative machine on stabilization of system of technical sight in accordance to requirements.

Exact agriculture, oscillation of machine, system of technical sight, inflexibility of pendant.

UDC 620: 95

Experimental determination of specific power STIRRING IN BIOMASS rotating REACTOR

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Powered experimental curves to determine the specific energy of mixing biomass in a rotating reactor.

The reactor, biomass, biogas, mixing power.

Problem. Improving the energy efficiency of biogas plants is one of the main areas of improvement process biogas as well as study methods for determining the specific power and energy parameters of operation of biogas plants requires constant improvement.

Analysis of recent research. The operation of biogas plants showed that facilitate contact with anaerobic bacteria biomass substrate is provided by mixing the substrate, but with intensive mixing should be avoided as this may result in termination of anaerobic digestion at the expense of symbiosis atsetohennyh and methanogenic bacteria. In practice, a compromise is achieved by slow rotation agitators or work within a short time [1]. At the same time, the experience of operating reactors biogas plants showed virtually impossible to eliminate separation of biomass in the reactor at mineral and organic sediment floating biomass, indicating deficiencies in the operation of the mixing biomass [2, 3].

We have developed a number of patented technical solutions that largely eliminate the separation of biomass by

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providing biomass mixing layers using embedded rotating biogas reactors. Defined as the level of immersion in liquid rotating digesters (distance from its center of rotation to the level of the liquid in which it is embedded) and coefficient of filling (distance from the center of the rotating digesters to the level of biomass in it) on the geometric parameters of rotary digesters and liquid density, which submerged rotating digesters while ensuring its location in the suspended state [4]. However, the question of determination of the rotation energy intensity reactor suspended state, submerged in water, require relevant research.

The purpose of research - Experimentally determine the power density of biomass mixing in a rotating reactor.

Results. Diagram of a rotating reactor is shown in Fig. 1. To ensure the rotation of the reactor should apply torque value of which is:

$$M_{КР} = M_{ОП} + M_{ВТЗ} + M_{ВТВ} + M_{ПБ} - M_{ОБ} + J\frac{d\omega}{dt} \quad (1)$$

where *ICC* - Torque for rotation of the reactor, NM; *ILO* - Moment of resistance bearings, NM; *MVTZ* - Moment viscous outer surface of the reactor about fluid, which is immersed reactor, NM; *MVTV* - Moment viscous inner surface of the reactor about liquid biomass, which is in the reactor, NM; *MPB* - The time required for recovery of biomass in the reactor during its rotation, NM; *MOB* - The moment that is created by the flow of lowering biomass in the reactor during its rotation, NM; *J* - Inertia moment digesters axis of rotation, kg m2; $\frac{d\omega}{dt}$ – angular acceleration of the rotation of the reactor rad / s2.

Multiplying each term of equation (1) on the angular velocity of the reactor obtain:

$$P_{КР} = P_{ОП} + P_{ВТЗ} + P_{ВТВ} + P_{ПБ} - P_{ОБ} + J\omega\frac{d\omega}{dt} \quad (2)$$

where ω - Angular velocity of the reactor, rad. / Sec; *RRC* - Power for the rotation of the reactor, W; *ROP* - Power resistance bearings, W; *RVTZ* - Power viscous outer surface of the reactor about fluid, which is immersed reactor, W; *RVTV* - Power viscous inner surface of the reactor about liquid biomass, which is located in the reactor, W; *RPB* - Capacity for recovery of biomass in the reactor during its rotation, W; *Rob* - Power flows lowering biomass in the reactor during its rotation, Vt.

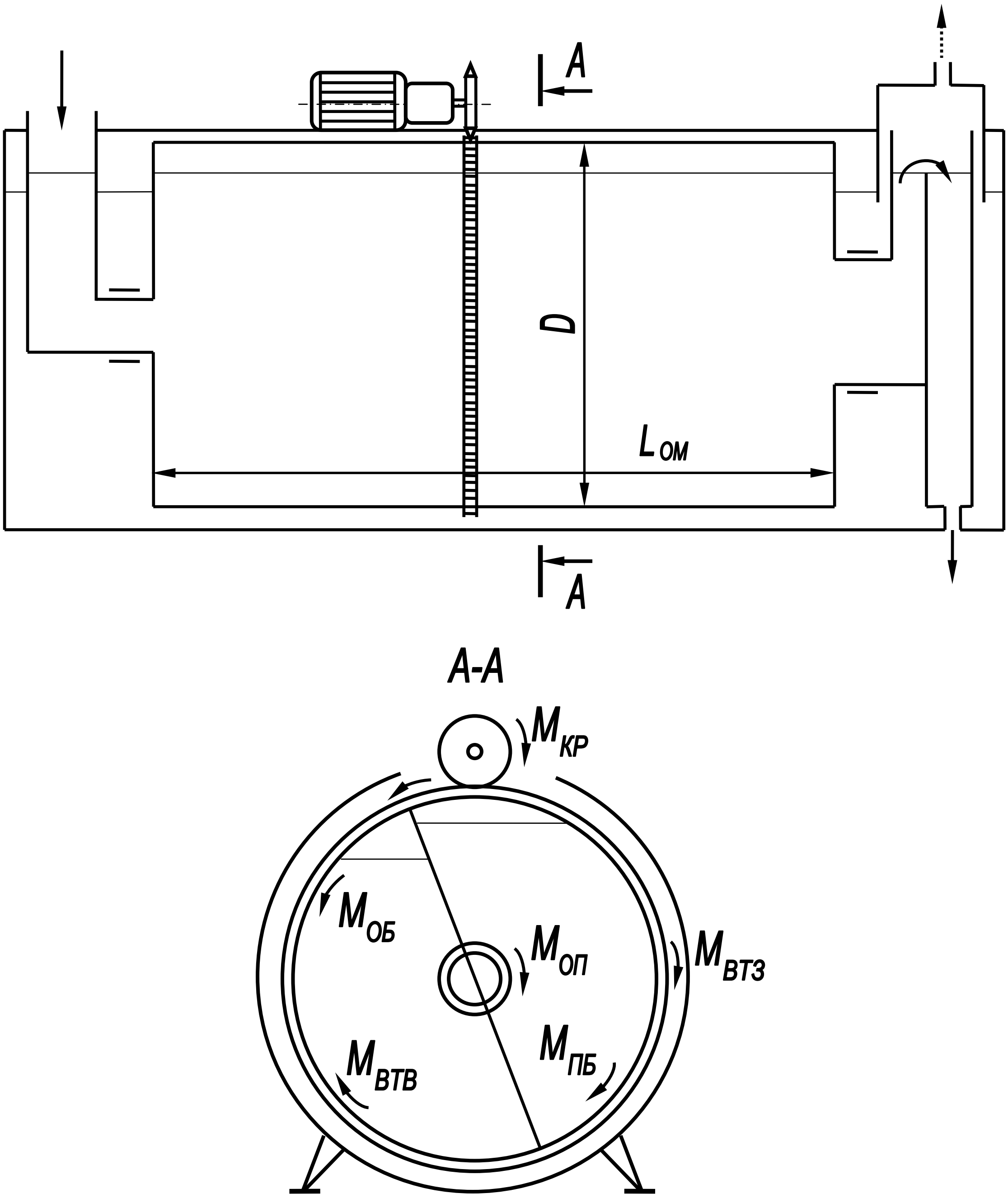

Fig. 1. Diagram of the rotating reactor (explanation in text).

Power consumption of the electric drive motor network, so be:

$$P = \left(P_{ОП} + P_{ВТЗ} + P_{ВТВ} + P_{ПБ} - P_{ОБ} + J\omega \frac{d\omega}{dt} \right) \left(\eta_{ЕД} \eta_{П} \cos\varphi \right)^{-1} \quad (4)$$

where P - Power consumed by the drive motor of the electric network, W; η_{EL} - Efficiency motor, ratio. ed .; η_{P} - Efficiency drive, ratio. ed .; $cos\varphi$ - The proportion of active power at full capacity motor, ratio. units.

Analyzing this expression, which is essentially the energy balance over the rotating reactor can say that the constant value of power consumption is only at full filling the internal volume digesters. Given the specificity of the reactor as part of its volume will always be filled with biogas, we can conclude that internal overflows of liquid in the reactor lead to cyclical shocks that would violate the static equilibrium of a rotating reactor and lead to cyclic changes in load.

The actual change in consumption of electric power consumed to drive the filled to 96% of experimental rotary reactor with an internal volume of 75.55 liters (0.4 m diameter) and its immersion in liquid 75% is shown in Fig. 2.

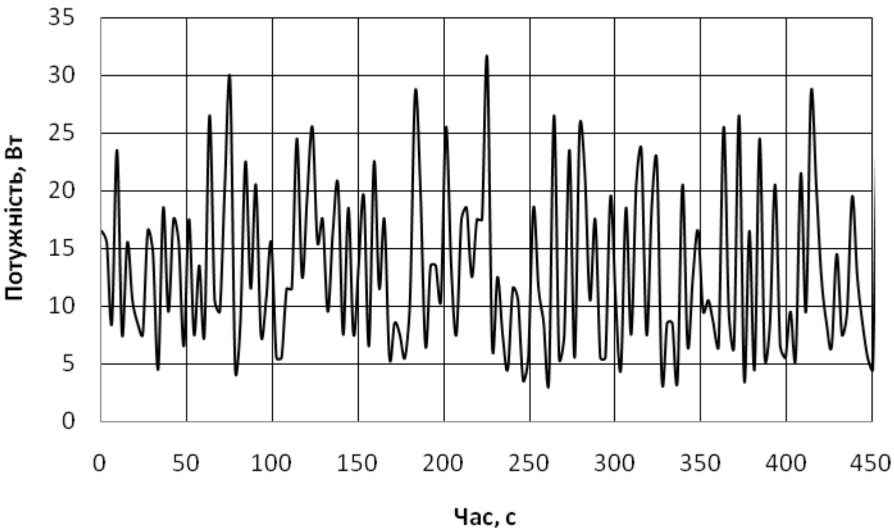

Fig. 2. Change of electrical power consumed during the rotating reactor.

Later in research used the average of the power consumption to drive the rotating reactor.

We have experimentally determined the average value of power required to drive the rotating reactor, depending on its fill factor (Fig. 3).

The analysis shows that increasing the fill factor of the rotating reactor average value of the power consumption increases due to increased costs for resistance in the bearing assembly, viscous friction against the inner surface of the reactor liquid biomass, which is located in the reactor, and to ensure recovery of biomass in the reactor during its rotation. With further increase in fill factor of a rotating reactor average value slightly decreases power consumption by reducing the flows of biomass and the cost of viscous friction against the inner surface of the reactor liquid biomass, which is located in the reactor.

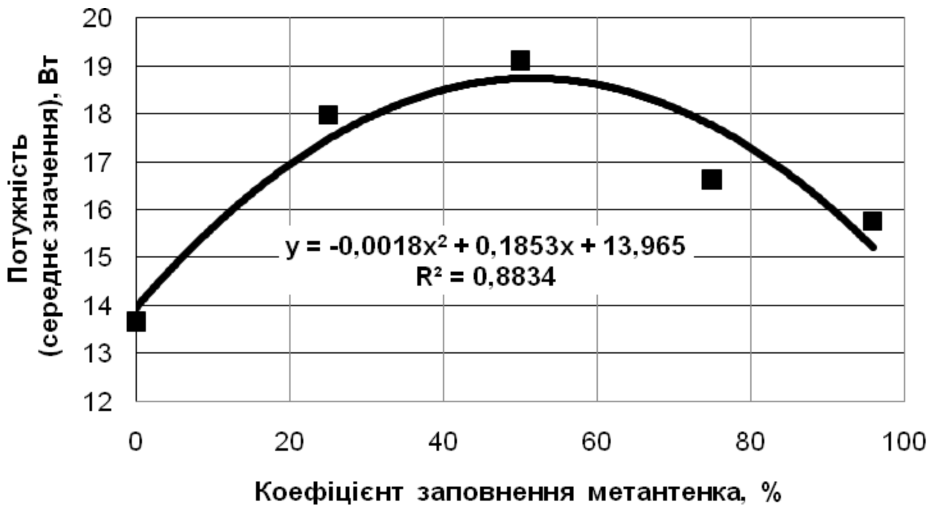

Fig. 3. Effect of fill factor rotating reactor at power drive mechanism

Mean power consumption required to drive the rotating reactor, depending on its immersion factor is shown in Fig. 4.

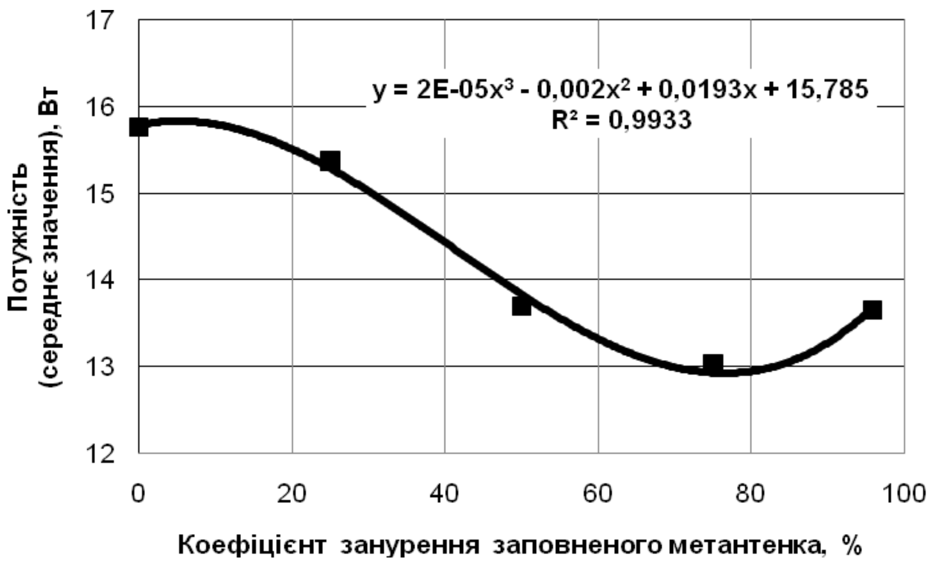

Fig. 4. Impact factor dive filled rotating digesters to power the drive mechanism.

The analysis shows that an increase in the coefficient of immersion in liquid rotating reactor, the average power consumption is reduced to the minimum value, due to a decrease in expenses for resistance in bearing units. With further increase of the immersion of a rotating reactor average value of power consumption slightly increased by increasing the viscous friction against the outer surface of the reactor liquid, which is immersed reactor.

Conclusion. The analysis can be argued that filled to 96% of a rotating reactor with an internal volume of 75.55 l (diameter 0.4 m) require minimum power to drive about 13 watts when it is immersed in the liquid by the amount of 75 to 77% . This specific power drive mechanism per volume of biomass in the reactor will be 0.179 kW / m3.

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Pryvedenы Experimental dependence for definitions udelnoy эnerhoemkosty peremeshyvanyya byomassы t vraschayuschemsya reactor.

Reactor, Byomassa, biogas, peremeshyvanye, power.

Experimental dependences to determine specific energy of mixing biomass in rotating reactor is adduced.

Reactor, Biomass, biogas, mixing, power.