Based poluchennыh Theoretically эksperymentalnыh dependence and engineering calculation method is designed teploutylyzatora parameters for zhyvotnovodcheskyh premises. Using razrabotannoho teploutylyzatora for pig-heads otkormochnyka 100 allows us umenshet rashod electricity when compared to bazovыm funds - Fan AOB-M1 ЭVO 0.9 (10 kW).

Teploutylyzator, methods, microclimate, zhyvotnovodcheskye the premises, temperature, heat transfer.

On basis of theoretical and experimental dependences of technique of engineering calculation of parameters of heat exchanger for livestock buildings. Using heat exchanger designed to piggery fattening 100 goals allows umenshet power consumption when compared to the base vehicle - fan heater AOB 0.9 M1-EVO (10 kW).

Heat recovery, methods, microclimate, animal room, temperature, heat transfer.

UDC 681.317.39

EVALUATION characteristics of errors in monitoring quality parameters of water impedance parameters

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We consider the electric model conductometric cell. The method of water quality control for their electrical parameters. Analysis of the characteristics of errors arising in the measurement of active and reactive component of conductivity.

Quality control, quality electrical impedance, error.

Formulation of the problem. Of particular interest to industry practices are electrochemical analysis methods to automate monitoring of water quality of centralized drinking water supply, control over the observance of technological regime in water treatment and environmental monitoring of human existence. [1] Noteworthy methods of monitoring water quality parameters for its electrical conductivity.

Analysis of recent research. Research methods for monitoring water quality and milk through conductometry presented in the literature [1-4]. In particular, [1] and [4] the control is with the active and reactive components of electrical conductivity. Analysis methods for monitoring milk for its electrical parameters considered in [5].

The purpose of research. To measure the electrical resistance (conductivity) use dvoelektrodni conductometric cell, and measure appropriate to alternating current. The equivalent circuit diagram dvoelektrodnoyi conductometric cell shown in Fig. 1.

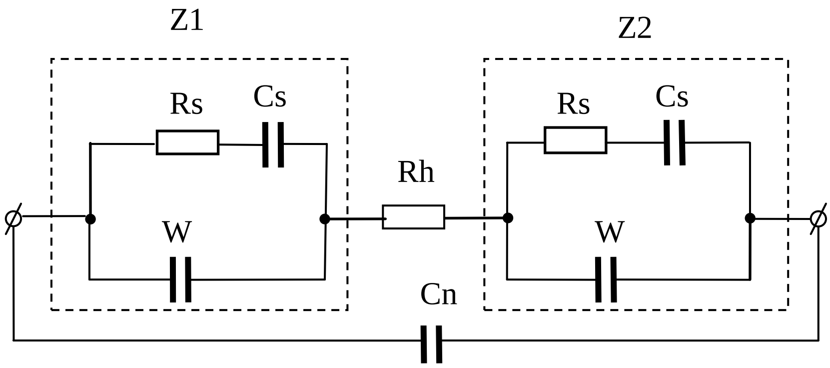

Fig. 1. The equivalent circuit dvoelektrodnoyi conductometric cell.

In this scheme Rh - resistance of the sample of drinking water. Rs resistance and capacitance Cs - elements that depend on the frequency, also called the Warburg impedance.

Results. The physical meaning of the processes that take place on the electrode in the flow of alternating current, can be represented as follows. Part of the current flowing through the electrolyte is spent on recharging the capacitor C, and the other - on the discharge of ions at the electrode, resulting in polarization creates additional resistance Rs and the capacitance Cs, and electrochemical polarization resistance (Fig. 1). With capacity - capacity double layer (independent of frequency), and the capacity $C_п$ (Parallel capacity) determined by the formula (1):

$$C_{П} = C_1 + C_2 + C_3, \qquad (1)$$

where: $C_1 = \frac{\varepsilon_0 \varepsilon_x S}{d}$; $C_2 = \frac{\varepsilon_0 \varepsilon_n S}{d}$; C_3 - Capacity between conductors that connect the electrolytic cell with a measuring tool.

Capacities C_1 and C_2 - Determined by the distance between the electrodes d, the electrode area S, and the dielectric constant of the solution ε_x and air ε_n. That is, the informative parameter which contains information on the composition of the electrolyte must be considered as the capacity C_1. In this case the parasitic capacitances that cause measurement errors must include only capacity C_2 and C_3. In the literature [2, 3] analysis of these vessels is not carried out, both informative parameter analyzed only solution is resistance and capacitance C_n taken as parasitic. It is therefore advisable to analyze the equivalent circuit for the active and reactive components as informative parameters of a comprehensive two-terminal multielement conduction, the circuit is shown in Fig. 1.

Research eclectic settings advisable to water at high frequencies. With increasing frequency to several tens of kilohertz elements CS and RS, depending on the frequency, can be taken to be zero 0. Then the measurement circuit much simpler and will take the following form (Fig. 2).

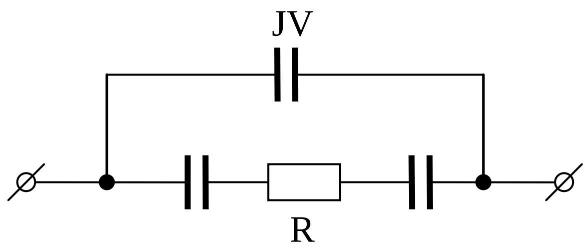

Fig. 2. Scheme of replacing the electrolytic cell in the measurements at high frequencies.

According to this scheme (Fig. 2) expression for the complex conductivity can be represented as follows:

$$Y = \frac{j\omega C + j\omega 2C_{\Pi} - \omega^2 C_{\Pi} RC}{2 + j\omega RC} = \frac{\left(j\omega C + j\omega 2C_{\Pi} - \omega^2 C_{\Pi} RC\right)\left(2 - j\omega^2 RC\right)}{4 + \omega^2 R^2 C^2}. \quad (2)$$

According to current trends it is advisable to measure active and reactive component of the electrical conductivity of water [4]. Isolate active and reactive component of conductivity. The active component (after necessary mathematical transformations) will be as follows:

$$\mathrm{Re}(Y) = G\frac{1}{1+\left(\frac{2G}{\omega C}\right)^2}. \quad (3)$$

From (2) reactive component conductivity can be written as follows:

$$\mathrm{Im}(Y) = \omega C_{\Pi}\left(1+\frac{2\frac{C}{C_{\Pi}}}{4+\omega^2 R^2 C^2}\right). \quad (4)$$

So for the equivalent circuit dvoelektrodnoyi electrolytic cell that is used to monitor drinking water quality highlighted the active and reactive component described formulas (3) and (4). As seen from the active component formulas conductivity is independent of the parasitic capacitance SP. However, the influence of parasitic capacitive impedance X = 1 /ω*JV* should be considered because it also creates uncertainty in the measurements.

Explore the error that occurs when water quality control using the equivalent circuit shown in Fig. 1. Consider measurement error separately for active and reactive component. For the active ingredient formula for calculating the relative measurement error will look like:

$$\delta_1 = \frac{\mathrm{Re}(Y) - \mathrm{Re}(Y_0)}{\mathrm{Re}(Y_0)} = \frac{\mathrm{Re}(Y)}{\mathrm{Re}(Y_0)} - 1. \quad (5)$$

For reactive component:

$$\delta_2 = \frac{\mathrm{Im}(Y) - \mathrm{Im}(Y_0)}{\mathrm{Im}(Y_0)} = \frac{\mathrm{Im}(Y)}{\mathrm{Im}(Y_0)} - 1. \quad (6)$$

In formulas (5) and (6) Y - conductivity of the sample of drinking water; Y0 - conductivity base sample of drinking water.

Substituting formula (3) and (4) in the formula (5) and (6) respectively, and performing necessary mathematical transformation, we obtain expressions for the estimation error active and reactive component:

$$\delta_{\mathrm{Re}} = \frac{1}{1 + 4\left(\frac{G}{\omega C}\right)^2} - 1. \quad (7)$$

$$\delta_{\mathrm{Im}} = \frac{2\frac{C}{C_{\Pi}}}{4 + \left(\frac{\omega C}{G}\right)^2}. \quad (8)$$

Analyzing the formula and rice. 2, it can be concluded that the $\omega \to \infty, \delta_{\mathrm{Re}} \to 0$ and $\delta_{\mathrm{Im}} \to 0$. Therefore, to improve the accuracy of measurement is advisable to hold at high frequencies.

Explore tracker error active component measurements by the formula (7) of the package Maple.

We assume that G /ω*C* = B. Obtain tracker δ_{Re} of G /ω*C* (Fig. 3).

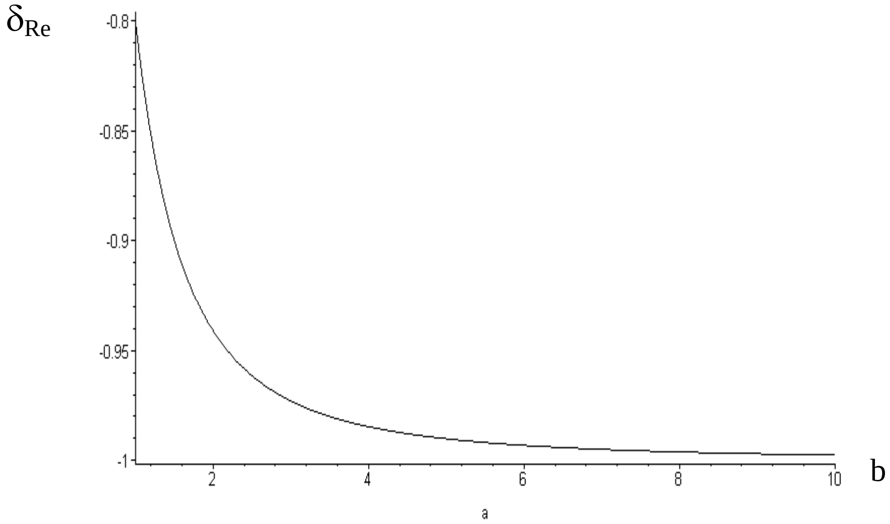

Fig. 3. tracker error active component measurements.

Explore tracker error measuring reactive component of the formula (8) To do this transformation C / CP = a, G /ωC = b. Obtain (Fig. 4):

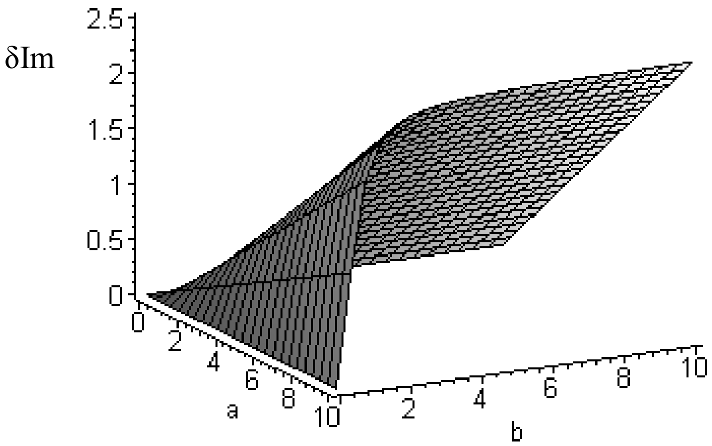

Fig. 4. tracker errors reactive component measurements.

Consequently, as follows from the above studies with increasing frequency measurement equivalent circuit of the electrolytic cell is simplified, and measurement error as active and reactive components is reduced. That is offset by the impact of often useless options on measurement results.

Conclusion. In control conductivity of water through the use dvoelektrodnoyi conductometric cell, it is advisable to carry out measurements at high frequencies to provide the required accuracy of measurement. Taking into account reactive component values of electrical conductivity of water can increase the sensitivity and accuracy of the method.

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In the work rassmatryvaetsya эlektrycheskaya model konduktometrycheskym cells. Method for monitoring water quality svoyh electric parameters. Analysis of characteristics oshybok, voznykayuschyh at aktyvnoy measurement and reactive sostavlyayuschey conduction.

Quality control, quality indicators эlektrofyzycheskye, impedance, pohreshnosty.

In paper the electric model of conductometric cell is examined. The method of water quality control for its electrical parameters is considered. The analysis of the characteristics of errors arising in the measurement of active and reactive component of conductivity.

Quality control, the electrical qualitative indeves, impedance, measurement error.

UDC 677.31

BACKGROUND OF RATIONAL sandwich panels OF CONSTRUCTION FOR felt livestock buildings

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As a result of calculating thermal properties of some structures of sandwich panels with construction schedules felt obtained distribution of temperature and dew point in its width. Nand theoretical studies on thermal properties of sandwich panel construction with felt set of rational composition «OSB (8 mm) - felt (20 mm) - layer (10 mm) - steel (0.5