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SENSOR CHARACTERISTICS MONITORING AND CONTROL OF SINGLE AND THREE-PHASE CURRENTS IN ELECTRIC NETWORKS

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ABSTRACT

The paper primary measurement and modification elements, their structural principles, research algorithms and software, as well as a wide range of functional capabilities of information and measurement tools, depending on the parameters of high functionality, high sensitivity, accuracy and reliable operation of control and management systems and devices in high quality power supply special attention is paid to the creation and application.

KEYWORDS: *Single And Three Phase Currents, Control And Management, Elements, Devices.*

INTRODUCTION

Targeted measures aimed at the development and implementation of elements, devices, tools and systems of control and management of single and three-phase currents of renewable energy sources in the power supply system of the Republic are being widely implemented. The Action Strategy for the further development of the Republic of Uzbekistan for 2017-2021, including "... introduction of information and communication technologies in the economy, social sphere, management system, ... reduction of energy and resource consumption in the economy, ... expansion of energy-saving technologies in production implementation "tasks. One of the important tasks is the creation of new sets of elements and tools of the control and management process, the development and implementation of primary information-measuring elements that change the control and management signals.

The results of the analysis showed that the complex application of modern techniques and technologies in the control and management of single, two, three and more phase current and voltage renewable energy sources of the power supply system, modeling and algorithmicization of signal generation processes required for management and monitoring, The issues of structural and parametric design of variables that allow evaluation, the development and implementation of a wide range of their functional capabilities have not been sufficiently studied [1,2].

Renewable energy sources are the subject of research from the study and application of electromagnetic current converters with enhanced functional capabilities for the control and management of single and three-phase currents [3,4].

Renewable energy sources include the study of the structural principles and application of electromagnetic converters of control and management of single and three-phase currents, the development of models, algorithms and research software, the creation and application of physical and technical effects models and research algorithms.

A renewable energy source power supply system is generated from reactive power sources that are installed near consumers, the main part of the reactive power generating a magnetic field and magnetic flux in electrical devices [4].

Renewable energy source power supply system S - full power transmitted from the power transmission device or network is determined as follows [3-5].

$$S = \sqrt{P^2 + Q^2}, \quad (1)$$

and the three-phase current is equal to:

$$I = \frac{\sqrt{P^2 + Q^2}}{\sqrt{3} \cdot U}, \quad (2)$$

There is P the active power (W, kW, MW),

Q - reactive power (VAr, kVAr, MVAr),

U - voltage (V, Kv).

In formulas (1) and (2), it is assumed that the active power is obtained entirely from the source at the beginning of the network [4-7].

When the reactive power supply with power Q_k is installed near the consumers, ie at the end of the network, the total power and current are as follows [2-4]:

$$S^{`} = \sqrt{P^2 + (Q - Q_K)^2}, \quad (3)$$

and current

$$I^{Б} = \frac{\sqrt{P^2 + (Q - Q_K)^2}}{\sqrt{3} \cdot U}, \quad (4)$$

There is Q_k is the reactive power of the energy source used as the compensating device.

As the current ratio is I` <I, the cross-sectional area of the cable of the power transmission line of the renewable energy source decreases, ie the capacity of the network increases, the additional active and reactive energy and power losses in the network significantly decrease [7- 10].

The characteristics of electromagnetic converters are important in the control and management of single and three-phase currents in renewable energy supply systems [4, 7, 9].

Renewable energy supply systems are single- and three-phase currents controlled and controlled by the same or different natural variables K [$\Phi_{\mu g}$ (x), U_{e2}] single natural change source and W [Φ_{μ} (0), $\Phi_{\mu g}$] different natural magnitude change source The static description of the parameter and the transformation of the transmission function to normal physical quantities is expressed in the following form:

$$U_{e2} = 2 \cdot \pi \cdot f \cdot I_{e1} \cdot w_{ov} \cdot w_{SE} \cdot \int_0^{l_{x.o}} \Phi_{\mu g}(x) \cdot dx \quad (5)$$

There is f-the primary current frequency; I_{e1}-primary input current value;

w_{SE}- number of packages of the sensing element; w_{ov} is the number of packages of the primary element; $l_{x.o}$is the height of the air gap; $\Phi_{\mu g}$ (x) -magnetic current.

The static characteristics of the variable of the control and management system obtained on the basis of computational and experimental studies are given in Figures 1-4.

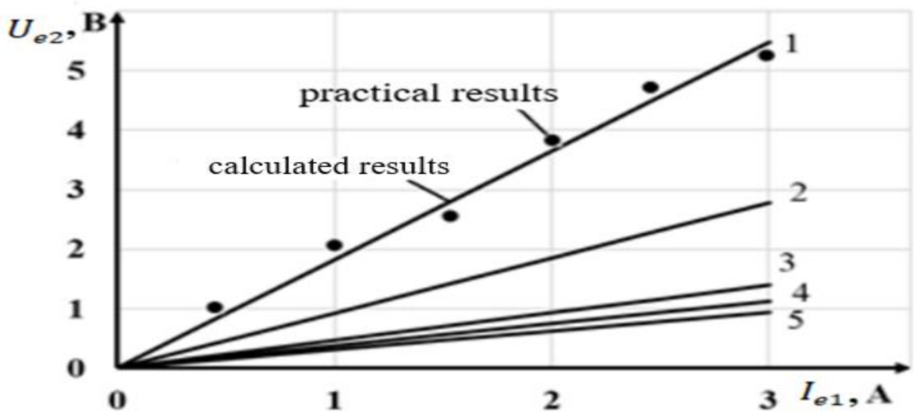

Figure 1.Static description of the dependence of the input current on the outputvoltage$U_{eoutput}$ at different values of the air gap balance.

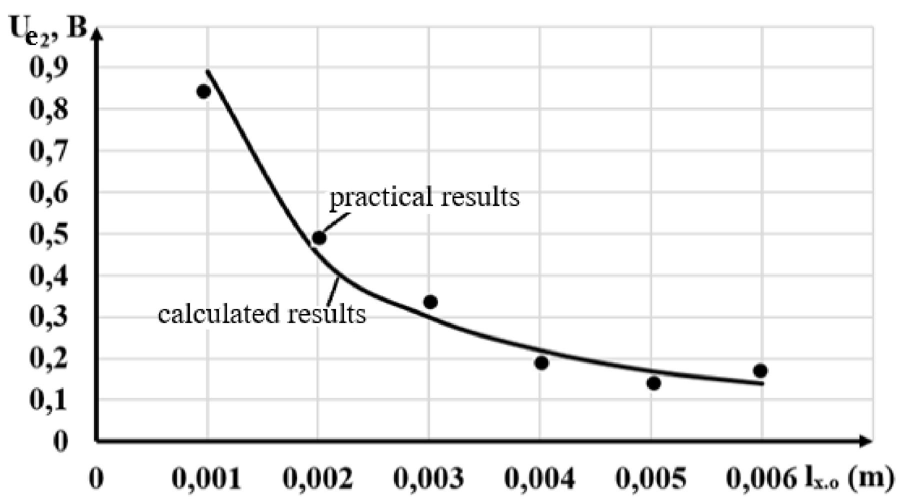

Figure 2.Static description of the dependence of the variable $l_{x.air}$ interval height on the output voltage $U_{eoutput}$.

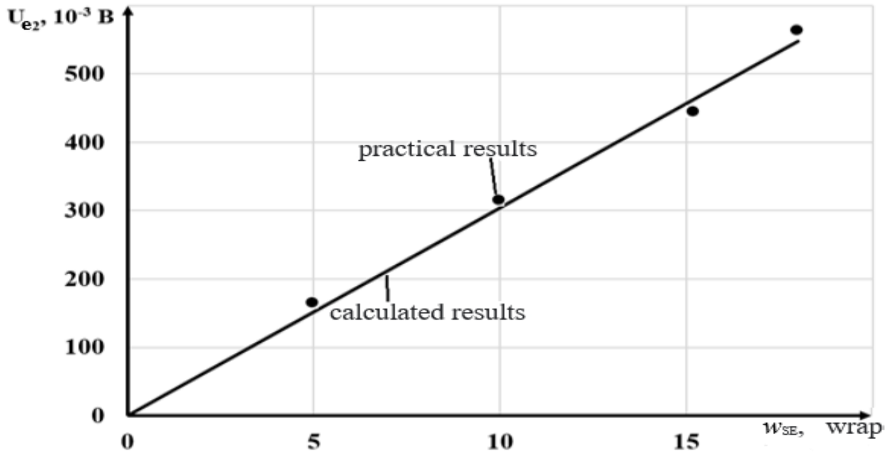

Figure 3. Sensitive element of the transducer w_{SE} Static description of the number of windings depending on the voltage $U_{eoutput}$output signal.

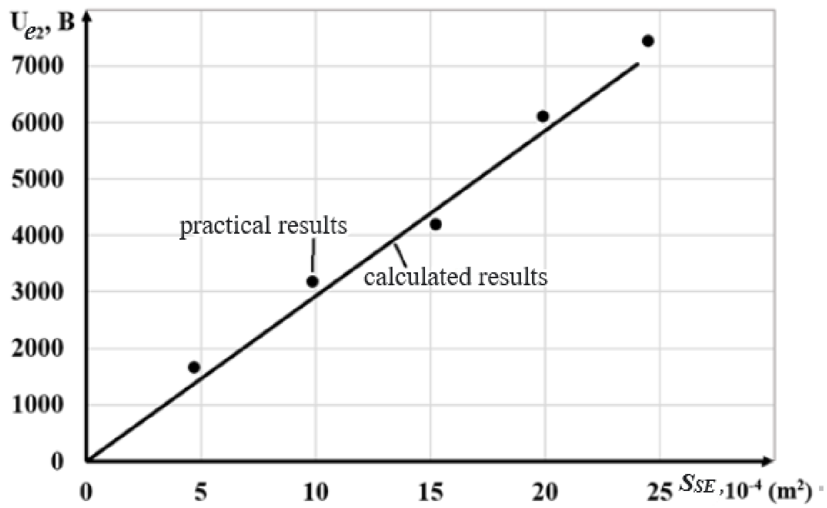

Figure 4.Voltage$U_{eoutput}$ of the cross-sectional surface of the sensitive elementS_{SE} of the converter.

Static description of the dependence on the output signal in the open view.

It can be concluded from the results that when the value of the air gap of the converter $l_{x.o}$ increases, the value of the output signal in the voltage$U_{eoutput}$ view decreases sharply, the increase in the number of windings of the sensitive elements fluctuates the change in the value of the output signal. When the number of windings of the sensing element is equal to the number of windings w_{SE}= 15-16, the output signal has a rational value when the height of the air gap is 0.002 - 0.003 m.

CONCLUSION

1. The principles of reliable control and management, models, information measuring instruments and power supply monitoring module of developed and advanced renewable energy supply systems provide stable energy supply.

2. The application of the created model of reliable control and management of electromagnetic converters of single and three-phase currents of renewable energy supply systems allows to increase the accuracy of calculation of the control signal by 0.68-1.55%.

3. As a result of the model-based study, equalizing the value of the air gap between the sensing element by 0.002-0.003 m and the number of its windings by 2-4 allows to provide the normative value of the output signal.

4. The single- and three-phase currents of the electromagnetic converter model allowed the formation of a steady state of the output signal after 0.03–0.04 seconds relative to the input signal (according to the standard requirement, the formation time of the steady state should not exceed 0.1 seconds).The total cumulative error of the converter was Δ = 0.49 percent.

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