UDC 681.518.3
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# AUTOMATICAL CONTROL OF THE PARAMETRES OF TRANSFORMER IN INFORMATION-MEASURING SYSTEMS

*In given clause the algorithm of the decision of a settlement-experimental problem with an opportunity of management threshold of an operation by automatic watching information-measuring system on an example of tracking temperature in two modes - the person on duty and the worker, without use of additional gauges and branches is offered.*
***Keywords:*** *intellectual information-measuring systems, threshold of mistake, gauges of temperature*

## Introduction

Today, it is hard to imagine the production or the production process without the use of information and measurement systems. In addition, rarely has a classic look which system: primary-secondary converter converter-analog-to-digital converter-at least, a microprocessor or microcontroller is a mass storage device. Virtually all of the removed information is stored and processed. Every day in every way these processes become more complex, from the simple to the extremely complex. Thus, modern information technology has already virtually replaced all previously known statistical and analytical departments, occupying a large amount of human resources, and technology, and most probably important-aspects of time. It is the need for instant solutions and makes a fast information technology assets.

Any information system has a number of metrological parameters and characteristics. Have been incorporating more intelligent information-measuring system that can almost instantly, taking a chance with the right solution, react to one or even several perturbing influences [1, 3, 5]. In this case, you may need to manage or monitor the same object, for example in standby or active mode. Or, for example, when you receive the warning, you must move the system of data collection with more precision or resolution. For this task you can connect additional channels, information-measuring systems or sensors. This raises the need for continued detention in hot standby equipment, to maintain a healthy state you need to periodically "polls", connecting it to the network. However, as we know, during transitional processes more often and provides equipment failures or malfunctions occur. More often the need to address such challenges manifests itself when using primary transducers for measuring non-electrical values. Predict failures of such measurement channels is hard enough.

**Main Part**

For such a task it would be better to of the same system in multilevel mode and manage on a level exceeding the absolute or relative error. To do this, you have the option of using mathematical modeling with varying degree of approximation or using different threshold-deviation error of the measured value from the set, such as a passport. The settlement and the experimental task taken arbitrary temperature sensors, experimentally removed their characteristics. Today, of course, there are various applications that can convert an array of data into the equation by mathematical models. For the ability to control, you must have at least two, and maybe more of these models.

Thermistors are of small dimensions, weight and heat, as a result, they can be used to measure the temperature of objects of small dimensions and low heat capacity. A small heat capacity makes them a small inertia. The downside of Thermistors are non-linearity of the conversion function and a large variation of parameters [1, 4]. Therefore, devices with thermistors have to graduate. The downside of thermistors are also changing over time (aging), and some instability in the electrical characteristics. However, after aging, which usually lasts for 2–4 months, further resistance change is slow and not more than 0.2% per year [2, 5]. If the temperature changes at smaller limits, or the accuracy of the changes is not high, it can be approximated by a function changes the output parameter as a straight line. Then we will look for the približaûŝuû function in the form of:

$$y = f(x, k, b) = kx + b. \quad (1)$$

Absolute difference for is defined as follows:

$$\Delta y_i = y_i - y_i^p = y_i - f(x_i) = y_i - (kx_i + b), \quad (2)$$

formula (2) as:

$$\sigma = \sum_{i=1}^{n} (\Delta y_i)^2 = \sum_{i=1}^{n} (y_i - (kx_i + b))^2. \quad (3)$$

The amount is a function with two parameters, the objective is to find the minimum of this function. Use the necessary condition of extremum:

$$\frac{\partial F(k,b)}{\partial k} = 0; \qquad \frac{\partial F(k,b)}{\partial b} = 0,$$

i.e.

$$\frac{\partial \sigma}{\partial k} = \frac{\partial \sum_{i=1}^{n} (\Delta y_i)^2}{\partial k} = \frac{\partial \sum_{i=1}^{n} (y_i - (kx_i + b))^2}{\partial k} = 0; \quad (4)$$

$$\frac{\partial\sigma}{\partial b}=\frac{\partial\sum_{i=1}^{n}(\Delta y_i)^2}{\partial b}=\frac{\partial\sum_{i=1}^{n}(y_i-(kx_i+b))^2}{\partial b}=0. \qquad (5)$$

Having a system of two equations with two unknowns on parameters and get the feature to a particular type of omitting mathematical write down an expression for the desired parameters:

$$k=\frac{n\sum_{i=1}^{n}x_iy_i-\sum_{i=1}^{n}x_i\sum_{i=1}^{n}y_i}{n\sum_{i=1}^{n}x_i^{\,2}-(\sum_{i=1}^{n}x_i)^2}; \qquad (6)$$

$$b=\frac{1}{n}(\sum_{i=1}^{n}y_i-k\sum_{i=1}^{n}x_i). \qquad (7)$$

Calculating the value, get the value of the mean square error of approximation. To find the formula expressing the relation between the two variables, if dependence is found experimentally, compare the settings of the same level with data obtained using the known formulas, compare the relative error of measurement. Formulas contain a small number of parameters, such as rates, degrees, etc., which you can change to some degree vary. The formula is too complex, the number of parameters must not be long. Usually take two or three parameters. When comparing pay attention to existence of maximums and minimums, the behavior for large and small values of the argument, camber curve up or down to individual sites, etc. by choosing among the known formulas suitable, you should select the parameter values to the difference between the experienced values and values found by the formula does not exceed the specified error experiment. If the difference is too large to repeat again adjusting the formula.

Let's look at the most commonly used formulas and their corresponding schedules for the given experiment with temperature. For example, the power dependence (geometric regression) has the form

$y=ax^b$ (8) show you how to find a function of a geometric approaching regression can be reduced to finding parameters of linear function. Assuming that the source table 1 values and functions are positive,

$$\ln y=\ln a+b\ln x. \qquad (9)$$

We introduce a new variable is a function of. Let then the equality (9) takes the form:

$$q(t)=a+bt, \qquad (10)$$

that task has been reduced again to find the function in the form of a linear approaching, that makes it much easier to study.

Almost approaching to find functions in the form of power, you must do the following: 1) values in the source data; 2) on new data find the settings and functions of the species approaching 3) using the designation applied to find the values of the parameters and variables and their expression (10). To define the settings and finally we get:

$$b = \frac{n\sum_{i=1}^{n} \ln x_i \ln y_i - \sum_{i=1}^{n} \ln x_i \sum_{i=1}^{n} \ln y_i}{n\sum_{i=1}^{n} (\ln x_i)^2 - \left(\sum_{i=1}^{n} \ln x_i\right)^2}; \tag{11}$$

$$a = \exp\left(\frac{1}{n}\left(\sum_{i=1}^{n} \ln y_i - k\sum_{i=1}^{n} \ln x_i\right)\right). \tag{12}$$

Consider getting exponential dependence that has the form:

$$y = f(x, a, k) = ae^{kx}. \tag{13}$$

If you found the experience of being a model, based on the schedule is a straight line whose slope is equal to the parameter if the value is unknown, the value of the parameter can be found by the formula for the value series and then take the average. Find the coefficients and for source table 1, if it is known that the function should look for in terms of exponential function (8). Find the logarithm of an equation :

$$\ln y = \ln a + kx, \tag{14}$$

with symbols $\ln y = q,\quad \ln a = A,$ rewrite (9):

$$q(x) = kx + a. \tag{15}$$

If you found the experience of being a model, based on the schedule is a straight line whose slope is equal to the parameter if the value is unknown, the value of the parameter can be found by the formula for the value series and then take the average. Find the coefficients and for source table 1, if it is known that the function should look for in terms of exponential function (8). Find the logarithm of an equation (13):

$$k = \frac{n\sum_{i=1}^{n} x_i \ln y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} \ln y_i}{n\sum_{i=1}^{n} (x_i)^2 - \left(\sum_{i=1}^{n} x_i\right)^2}; \tag{16}$$

$$a = \exp\left(\frac{1}{n}\left(\sum_{i=1}^{n} \ln y_i - k\sum_{i=1}^{n} x_i\right)\right). \tag{17}$$

1. The same technique can be applied to obtain a mathematical model using linear-fractional, fractional-rational functions, logarithmic functions, hyperbolic dependencies. For solving the problem of approximation of least squares function, state the main steps of the algorithm. 1. data input. 2. choose the type of regression equations. 3. data conversion to linear type dependencies. 4. getting the parameters of the regression equation. 5. convert data and compute the sum of squares of deviations of the calculated values from the specified function. 6. output. 7. calculation of the mean quadratic error

**Conclusions**

In this article, the requested solution and experimental tasks with the ability to manage threshold automatic tracking information-measuring system for temperature monitoring in two modes-normal and working, without using additional sensors and branches. According to the results of the experiment and the data produced the following results: 1. Received linear model:

$$y=1888860\cdot x - 5558{,}854$$

2. 2. Received power model:

$$y=3{,}90033\cdot 10^{34}\cdot x^{12{,}8}$$

3. Received exponential model:

$$y=1{,}19\cdot 10^{-3}\cdot e^{4001{,}283\cdot x}$$

Calculation of absolute and relative mean square error showed the following results. For linear models, the absolute erro – 2.35 ohms; relative – 1.13%; for absolute error model of power – 1.72 ohm; relative – 0.095%; for an exponential model of absolute error – 0.48 ohm; relative – 0.0095%. Thus, we get the opportunity of automatic control at the specified range of scatter parameters of primary converter. In the same way, you can get a mathematical relationship for modulating control is in error as the threshold of activation information-measuring system.

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