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MODERN PRINCIPLES OF MEASUREMENT AND PROCESSING OF NON-SINUSOIDAL SIGNALS

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At present because of the rapid increase in need to electrical energy led to creation of effective electrical power suppliers and counters. While creating such devices one of important challenges is measurement of active power in a condition of non-sinusoidal currents and voltage [1]. So, wide implementation of non-linear elements in electrical equipments is the one of main reasons causing distortions in signals in power sources of relative actuators. Regarding this problem lots of theoretical and practical researches were carried out and some results were achieved [1, 2]. But still the problem of accurate measurement of active power and energy within practical, technical-economical constraints is unsolved. To substantiate this idea it's enough to remind the broad usage of electromechanical energy counters in industry.

Alternating current signal has a non-sinusoidal character in many cases. However in sinusoidal signals the reason for high harmonies is the addition of noises and obstacles, in non-sinusoidal signals this is connected with production and consumption processes of electrical energy.

In the research paper, conversion and analysis of instrument errors of digital processing tracts of sinusoidal signals are given and resolved. Errors created due to methods that are used during realization of "measure-process" tracts of non-sinusoidal signals are mentioned below and some important point are given.

1)Transformation of analogue signal vectors $X = \phi[\lambda]$ using $X = \{x_1(t), x_2(t), ..., x_m(t)\}$ initial information transmitters of monitored parameter vectors of automation objects $\lambda = \{\lambda_1(t), \lambda_2(t), ..., \lambda_\ell(t)\}$.

2) Transformation to digital signal vectors $Y_i = F(X)$ of integral parameters of X signal flow in discrete area $F = \{F_1, F_2, ..., F_n\}$ of $Y_\xi = \{y_1(t_i), y_2(t_i), ..., y_q(t_i)\}$, $i = \overline{0, M-1}$ operator.

3) Calculation of Y_ξ of integral parameters $I = \{I_1, I_2, ..., I_p\}$ of digital signal flow $I = I[Y_\xi]$, $i = \overline{0, M-1}$.

Considering development trend of information-measurement systems we can easily benefit from advantages of technology. For that, $\lambda(t) \to x(t) \to x(t_i) \to y(t_i) \to I$ algorithm considered to be more suitable for purpose. In here, $\lambda(t) \to x(t)$ transformation i.e. $x(t) = \Phi[\lambda(t)]$ problematic issue of relationship of "automation object + information transmitter" where signal errors $x^*(t) = x(t) + \Delta x(t)$ are observed. This issue is still outstanding.

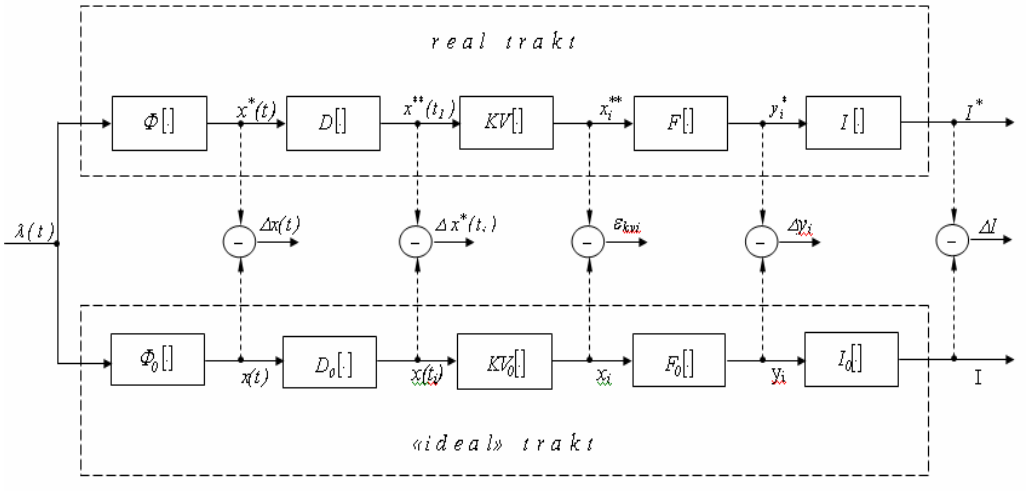
Problematic issues of dynamic measure to be $x^*(t) \to x_i^*$ analogue-digital transformation D discrete and accompanies by corresponding errors by quantum in KV processes [3]. Heritable error creates time $\Delta x(t)$ discrete and quantum of the signal of noise $\lambda(t) \to x(t)$ measurement received from the first stage addition problems, it is received (here, is row quantum ε_{KVi}) that is in the picture of real result $x_i^{**} = x(t_i) + \Delta x^*(t_i) + \varepsilon_{KVi}$.

It accompanies by a few number of methodical (approximation of the functional dependence) and instrumental (to round off) errors in the process of the realize of the operator of corresponding F. Real digital signal which has received as a result $y_i^* = y_i + \Delta y_i$.

$y_i^* = F\left\lfloor x_i^{**} \right\rfloor$ discrete average $y_i^* \to I^*$ (and or discrete integral) happens conversion of the noise ΔI lower function in process and rounding off $I^* = I + \Delta I$ result took this time and it accompanies with operator noise.

Other sinusoidal signals have been approached analysis of the errors in turn instantly and primary processing of the values of the signals in the work system. It has been noted that it is not systematically to "measure-processing" process in existing work seen in this area, changing some have been approached view point of method and errors of means. Offering model and it consists of liquidating purpose this shortage in the methods.

"Measure-processing " of the system of measurement information tract offered and but operators of real tract, D, F, KV, Y, "ideal" tract have been described with operators of 0. Corresponding D_0, F_0, KV_0, I_0 in developed metrological model (picture 1).



Picture 1

"Ideal" tract have been accepted as the following conditions about operators below:

Described function $\Phi_0[\cdot]$ of face-value $x(t) = \Phi_{nom}[\lambda(t)]$ transformation operator. Coefficients are valued $\Phi_{nom}[\lambda(t)] = \sum_{j=0}^{p-1} a_j [\lambda(t)]^j$ information conversion a_0, a_1, a_{p-1} and composition metrological tests while production.

$D_0[\cdot]$ and $KV_0[\cdot]$ operators "ideal" discrete and levels the number of quantum of infinite values of "ideal" which be is appropriate analogue-digital task in the dynamic regime built on the basis of transformation.

"Infinite" operator floors the number of big errors of rounding off to zero and approximation is appropriate "infinite" potential-impulse realized by less piece functional transformation of the F(x) function.

Error of rounding off operator with answering to condition of the numbers and methodical error of the knot points is device about zero discrete halve.

"Ideal" tract height have been shown superiorities of the metrological model offered from point of view to analyse processes of occurring and transformation of the suitable errors by corresponding real operators on the basis of differences of the speeches of the operators.

Having the filter feature of errors (primary information errors discrete transmitter errors, errors of quantum of turn instantly and primary processing of the marks of the signals of other sinusoidal taken basically and problem of liquidate of each tract have been put.

So, elect and specify non sinusoidal metrological descriptions of the other sinusoidal processes of turn and digital processing of the other sinusoidal signals and "measure-processing" have been created necessary generalized metrological base being from point of view grounding of tract functional joints.

Literature

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