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MODERN METHOD OF INCREASE OF ACCURACY OF MEASUREMENT OF PARAMETERS OF TECHNOLOGICAL PROCESSES IN THE OIL AND GAS INDUSTRY

Kamran Mehdiyev[1], S. Abdullayev[2]

[1]Institute of Chemical Problems ANAS, Baku, Azerbaijan
[2]Azerbaijan Technical University
almazmehdiyeva@yahoo.com

In paper electric equipments and electro receivers are examined worse influence voltage and currents non sinusoidal for networks work. Methods of reduction non sinusoidal are shown.

Undoubtedly, that today oil and gas and chemical branches take leading positions in republic economy. Innovative activity is a solving element of development of the modern industrial enterprises, the further modernisation of the enterprises and the decision of variety of the problems connected with increase of efficiency, technological and ecological safety of manufactures is required.

Economic globalisation leads to consolidation of the companies of the oil and gas market and forces them to search for new ways of increase of efficiency of extraction, processing and sale. Information technologies play the important role in these processes - they help to reduce expenses on integration of the absorbed companies and to provide reliable work of all information structure of the enterprise. Without effective IT System it is impossible to provide acceptance of correct decisions, an optimum operating mode of technological installations of processing and processes of the closed cycle, visualisation of geophysical data and group work in a remote mode.

Today for oil refining branch priority problems are reduction of expenses, flexibility improvement, observance of laws on preservation of the environment and optimisation of stocks. Oil, gas and a petroleum-refining industry the IT Systems providing the highest productivity, full reliability of received data and capable to process huge files of the information are necessary to the enterprises. At the same time such systems should be flexible enough for compatibility with various appendices, support of a remote operating mode of users and effective integration with information systems of the got companies.

The modern information-measuring system represents virtual a gauge and the information service, being deep the integrated set of measuring, computing both other means and carrying out measuring, information and logic functions. In the conditions of constantly growing requirement for gauges, variety of their execution and scopes at the becoming tougher requirements shown to their indicators of quality and efficiency, the problem of working out and development of theoretical, methodological and practical aspects of creation of highly effective information-measuring systems gets a special urgency. Present article is devoted increase of accuracy of transformation and digital processing of not sinusoidal signals which are the basic and most difficult carrier of the measuring information in information-measuring systems.

The occurrence reasons of non sinusoidal pressure and currents in an electric network - presence vent converting installations and electro-receivers with nonlinear volt-ampere the characteristic. The basic influence render vent converters. Generators or transformers at their work on a nonlinear part of a curve of magnetisation can be sources non sinusoidal in power supply systems also.

Adverse influence non sinusoidal for work of networks, an electric equipment and electroreceivers consists in the following: there are additional losses in electric cars, transformers and networks, and also additional deviations of pressure; service life of isolation of electric cars and devices is reduced; work of devices of automatics, telemechanics and communication worsens.

Presence of the higher harmonics of currents and pressure essentially increases errors of active and jet counters of induction type. The hindrances caused by the higher harmonics, can lead to deterioration of work of devices of automatics, telemechanics and communication. Current harmonics, getting into networks of power supply systems, lead to deterioration of work of high-frequency communication and automatics systems and as cause false operations of some relay protection. Non sinusoidal pressure and currents causes infringements of technological processes in a measure, than all other parameters of quality of the electric power.

The damage because of non sinusoidal currents and pressure basically is caused by additional losses of capacity and reduction of service life of isolation of electric equipment (first of all electric motors).

Decrease non sinusoidal pressure and currents is necessary when values of currents or pressure of the higher harmonics more admissible. The expediency of measures on fall non sinusoidal can be caused also and improvement of technical and economic indicators of work of elements of electric networks. Decrease non sinusoidal can be carried out one of next ways: decrease in level of the higher harmonics generated vent by converters; rational construction of the scheme of an electric network; use of filters of the higher harmonics.

As an initial not sinusoidal signal we will accept a sinusoid with 13 odd harmonics of a kind imposed on it:

$$y(ik) = \sum_{n=1}^{2N+1} sin(\omega knT_0), \quad N = \overline{1,6}$$

where ω is bearing frequency of a signal, T_0 is a digitization interval (T_0=1/1300), t_o is numbers of discrete readout, *n* - numbers of harmonics.

As a resultant of an error of a signal the sum of the casual error in regular intervals distributed on a piece [0, 1], by generated built in function Matlab rand and the regular error of the second order described by function of a kind was considered

$$\bar{\varepsilon}(t_k) = \sum_{j=0}^{2} a_j t_k^j$$

.

Spectra of initial signals are calculated in program Matlab environment by means of fast transformation Fourier - functions fft. On fig. 1 (a) the resultant an error, on fig. 1 is represented. (b) a-initial not sinusoidal signal, on fig. 1 (v, q) - spectra of corresponding initial signals.

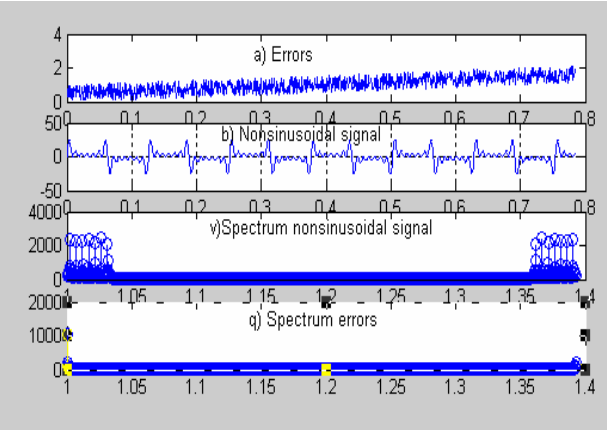

Fig. 1

Further as a result of product of not sinusoidal signal and an error it is received result signal, which spectrum is represented on fig. 2 (a). Apparently from fig. 2 (a) result spectrum contains in the structure certain quantity of harmonics (13).

The calculations resulted on fig. 2 (b) have shown, that in a spectrum influence of additional harmonics has considerably decreased. Their amplitude became an order 20 that is there was a considerable suppression of a spectrum.

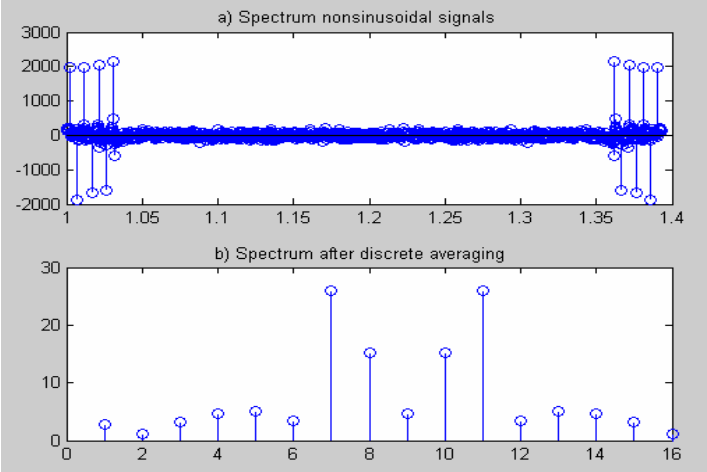

Fig. 2

To suppression of these harmonics we had been applied a method of discrete averaging result signal on uniform intervals. Above resulted results testify to correcting properties of the operator of discrete averaging in relation to not sinusoidal signals, to regular and casual components of an error.

In work correcting properties of the operator of discrete averaging are investigated at digital measurements of integrated parameters of not sinusoidal signals. By application of statistical modelling it is proved, that this operator possesses correcting properties in relation to suppression of regular and casual errors of signals of pressure and a current.

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