

ABSTRACT

for Kryukova Yelena Viktorovna's «Improvement of Methods of Diagnostics of Eccentricity Rotor of Asynchronous Engines» dissertation, presented for conquest of the degree of Doctor of Philosophy (PhD) by specialty 6D071800 – «Power industry»

Keywords. Asynchronous engine, diagnostics, rotor eccentricity, methods of signal processing, spectral analysis, additional current, artificial neural network, Fourier's window transformation.

Relevance of research. Most often in power industry and industry asynchronous engines (AE) are used. As practice of AE operation shows about a half of them a long time work with static rotor eccentricity. If rotor shift less than 80% of an air gap, such operation usually does not lead to an immediate breakdown of AE, but is accompanied by a considerable over expenditure of the electric power, thus the cost of losses of the electric power for a year of operation is commensurable with the cost of the engine.

If at eccentricity a rotor touches a stator, there is a sharp warming up of their cores, as a result in a stator slot wedges burn out and there is an accelerated aging of isolation of a winding which, as a rule, leads to an end with inter phase short circuit. At the same time under the influence of warm the rotor winding is collapsed partially or completely. Timely diagnosing of rotor eccentricity in use of AE allows to be limited only by replacement of bearings or adjustment of an air gap.

Most often as a diagnostic sign of rotor eccentricity in diagnostic systems one of components of additional current of AE phase of stator is used. At the same time values of these components at the fixed value of eccentricity aren't constant in time, and the increase of eccentricity isn't always accompanied by their growth.

It also defined lack of a simple and reliable way of receiving and processing information for identification of rotor eccentricity in AE. Thus, improvement of diagnostics methods of rotor eccentricity of AE is an actual task.

The purpose of the work is improvement of diagnostics methods of rotor eccentricity of asynchronous engines by the way of development of new ways of allocation of diagnostic signs.

Results of the work are a method of correction of components of information signal at fluctuation of tension of a power line, a method of window transformation of Fourier with an adaptive window, ways of recognition of existence and value of rotor eccentricity on the basis of application of an artificial neural network and operating value of additional current, method of definition of criteria, technological scheme of diagnostic systems and its software.

Object of the research is diagnosing area of damages of rotor eccentricity of AE.

Scientific novelty. In work the reasons limiting sensitivity of systems of rotor eccentricity diagnostics are investigated, method of correction of components of information signal at fluctuation tension of a power line and a method of window transformation of Fourier with adaptive window for decrease in influence of these reasons are developed, on the basis using artificial neural network and

operating value of additional current ways of recognition of rotor eccentricity are offered, and also the criterion of determination its value by value of technological eccentricity with diagnosing AE in modes "Control" and "Diagnostics" is proved.

Practical value. It is revealed that the main reasons, limiting sensitivity of diagnostic systems of rotor eccentricity of AE are fluctuations of parameters of a network and unevenness of the moment of its loading. To avoid this we offered to carry out diagnostics in an idling mode, and for processing information signal to use a method of window transformation Fourier with an adaptive window to carry out correction its components. For definition existence and value of rotor eccentricity it is recommended to apply artificial neural network and operating value of additional current. The technological scheme of diagnostic system of rotor eccentricity and software "Elena-2014" for its realization is developed.

Data on publications. Basic provisions of the dissertation are published in 12 scientific works, including in editions recommended by the Committee for control and certification in the sphere of education and science of the ministry of education and science of the Republic of Kazakhstan– 4, in magazines having nonzero impact-factor and entering in information database of the Scopus company - 3, in materials of the international scientific and practical conferences – 4, 1-in the magazine "News of Higher educational institutions. Electromecanics", one positive decision for giving a patent of the Republic of Kazakhstan is also received.

Structure and volume of the dissertation. The dissertation consists of introduction, 4 parts, conclusion and appendixes. Work is stated on 91 pages of computer text, includes 42 drawings and 5 tables. List of used sources includes 115 names.