DETERMINING THE LEVEL OF FACTORS AFFECTING THE OPERATIONAL RELIABILITY OF TEXTILE MACHINE ELECTRICAL DRIVES

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ABSTRACT

It is necessary to ensure the optimal operation of the electrical system in order to save energy and increase reliability. For this, the advantages of artificial intelligence are used. The three-phase asynchronous motor considered in the study requires the least maintenance due to its high efficiency and robust construction. The electric drive system is composed of power supply, power control, capacitors, three-phase asynchronous motor, intelligent control unit and load set.

Keywords: weaving machine, neural network, electric motors, reliability, textile machine, methodology, differential and algebraic equations.

INTRODUCTION

As an indicator of reliability, the following systems were formed:

- Diagnosis of asynchronous motor faults;
- Anomaly detection of faults;
- Classification of faults.

After the improvement of power quality, three-phase asynchronous motor faults were diagnosed, as faults in the electric drive system adversely affect system reliability, operability, availability, and maintainability. This is done by the fault detection and diagnostic system operating in the control unit. Agents from both sides are compared to identify anomalies and classify errors.

It is known that energy-saving technical solutions in weaving machines, the existing variety developed, depend on the available opportunities to increase productivity and reduce energy consumption. Common ways to increase system reliability include:

- introduction of new energy and resource-saving technologies based on experimental research of weaving machines;

-mathematical modeling and determination of the required indicators within a

certain period of time;

A sound energy management program is required to provide a framework for positive change and guide energy management in the enterprise. Therefore, continuous improvement of energy efficiency can only be achieved if there is a strong organizational commitment. Energy management programs help ensure that energy efficiency improvements are not just a one-time thing, but a continuous improvement process.

It is possible to represent comprehensive reliability indicators of the main electrical parameters through an artificial neural network and perform fault classification based on them.

Tension control in weaving machines is an important energy distribution control program that supports tension based on measured data [3].

On the other hand, a decentralized control scheme uses real-time measurements to control one or a group of voltage controllers to achieve a specific goal. This affects the reliability of weaving machines. Formal models can be regressive, autoregressive, moving average through the practical statistical analysis of dependences of input and output parameters of the object in controlled electric motors [6].

LITERATURE REVIEW

When considering the possibilities of implementation of neural associative memory, it is proposed to implement associative memory by multiplying the associative vector by the matrix of associations. As a result of this action, the input vector is restored. In turn, the association matrix is obtained by summing the individual input and the association matrix of the associative vector. Multi-layer neural-like networks, that is, networks with feedback, have a structure that implements associative memory.

The association matrix is calculated according to the following formula:

$$W = \sum_{i} A_i^T B_i \qquad (1.1)$$

Here A_i and B_i are input and associative vectors, W is an association matrix. We can see the level of electrical conductivity temperature resistance in Figure 1. It was considered in the model that failure cases in the range from -80 °C to +150 °C affect the operational reliability.

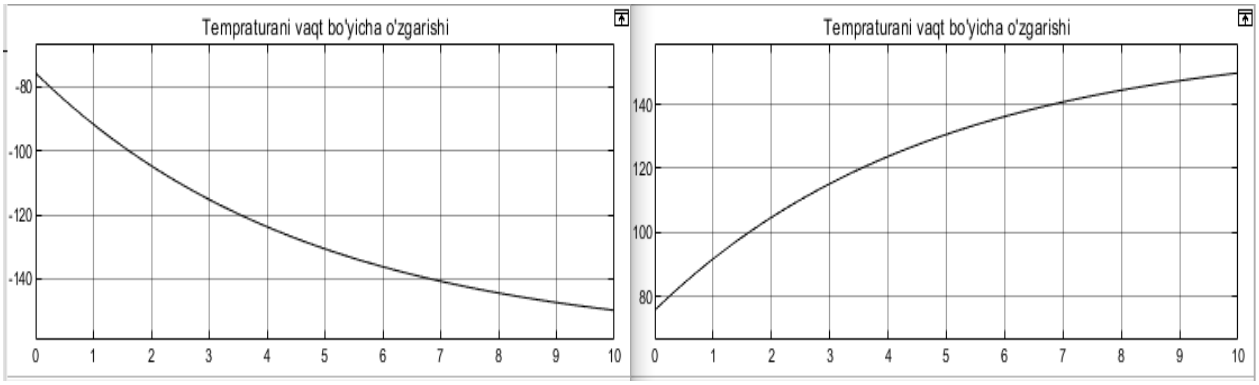

Figure 1. The level of temperature resistance of the electric drive of the weaving machine

There are specific methods of fault diagnosis, in which, by using neural networks, unit values of fault diagnosis can be organized based on the method. However, the non-linear features present in real signals are not picked up by the artificial neuron, although it has the ability to extract strong features.

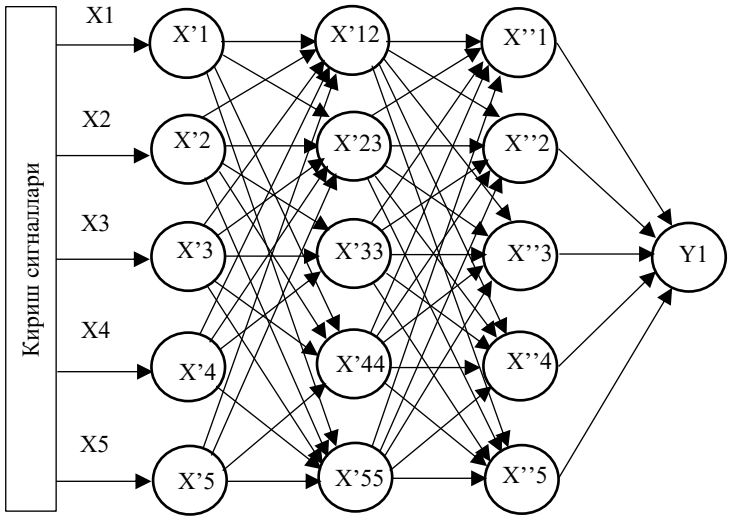

Figure 2. A standard neural network

An algorithm is organized by reducing the analysis signals and detecting the errors that remain unchecked.

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