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EXISTING METHODS OF INVESTIGATION OF ASYNCHRONOUS MOTORS

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Түйін

Берілген мақалада үшфазалы асинхронды қозғалтқыш параметрлерінің орнатылған және өтпелі жұмыс режимдерінде бар әдіс-тәсілдерге шолу жасалған.

Резюме

В данной статье расмотрен обзор существующих методов исследования установившихся и переходных режимов работы асинхронных двигателей.

Keywords: Asynchronous engines, frequency, electric power, tension.

Since the invention of M.O. Dolivo–Dobrovolsky three-phase asynchronous motor with principal design features remained unchanged to the present day, it has been more than a century. During this time, the theory describing his work, has not undergone revolutionary changes. Equivalent circuits are the basic unit for the calculation of asynchronous machines. Equivalent circuit AD, just like any other electric machine is obtained by replacing a real circuit of the engine circuit with lumped parameters. Strictly speaking, these chains have, purely in the form of resistance wire, for example, has its own capacitance and inductance, which although it can be made very small, but it varies with the resistance. However, to calculate the characteristics of this change can be neglected. Mathematical studies of steady regimes in such circuits conducted on the basis of generalized AC Ohm's and Kirchhoff's laws, and transients are described by systems of differential equations. At various times, various schemes have been proposed replacement AD. The most widely T- and L-shaped equivalent circuit. This can be explained by their relative ease with one hand, and sufficient accuracy for engineering calculations on the other. These equivalent circuit BP are modifications that reflect different degrees of refinement. It should be noted that until now by different authors proposed a new equivalent circuit AD. For an accurate calculation of the parameters of

equivalent circuits necessary to perform the calculation of the electromagnetic field in the BP r. E. To solve a system of equations of mathematical physics partial - Maxwell equations. Classical methods for calculating the parameters in various modes of blood pressure based on replacing the real picture of the field estimated, approximate, as well as making a number of assumptions. Furthermore, many existing mainly factory, methods of calculating the inductive parameters are based on AD empirical coefficients thus possible to achieve sufficient accuracy for engineering calculations.

Based on the L-shaped equivalent circuit for the study can be used t. N. pie chart of BP. But the use of this method results in significant inaccuracies in the results as a pie chart of the real blood pressure due to changes in the parameters is not a pie. The theory of transient processes in blood pressure has developed over the last century quite rapidly. This process went along with the development of the theory of transients in synchronous machines. Significant contribution to the development of the theory of transients in AC machines was made by all the scientists of the world: Gorev,. Cargo, Kazovsky, Kovacs, Kononenko, Kopylov , Lyon, Mammadov, Masandilov, Petrov, Postnikov, J. Raz, Sipajlo, Sokolov, Treshchev I. et al. Until now, the big interest in the study of transients in electrical machines and in particular AD manifested both in our country and abroad. At the beginning and in the middle of the last century, when it became the theory of transients in electrical machines, the researchers were only armed with analytical calculation methods, mainly operator. Nowadays, the most widely used are various numerical methods for calculation of transients using modern software. As already mentioned, blood pressure transients investigated using a mathematical model, which is a system of differential equations describing the operation of the engine.

Differential equations are written based on the chain of equations and equations of motion of the rotor. The parameters of the blood pressure used in the system as coefficients. To simplify the conversion made to various coordinate axes. Variables can be current, flux coils. Using any of the numerical methods, can be determined according to change any of the variables of time. But there are other modern approaches. Tensor methodology involves the use of variables in the form of the tensor, t. E. Without regard to any coordinate axes. The origins of this approach dates back to the works of Crohn's. This method is not widely used due to its complexity. The method involves the conductivities of the tooth contours of the resulting representation of the machine field as a set of

fields of the individual contours of the tooth, found in special boundary conditions. This method was developed at the department of electrical machines MEI under the guidance of V. Ivanov-Smolensky. Despite the versatility of this method is quite laborious to implement. Therefore, it is appropriate to apply for the study of new designs and types of electric vehicles, whose theory is not sufficiently developed. Of particular interest are the works of S. Yamamura devoted to his theory of spiral vectors (SV). When analyzing circuits and AC machines in a steady mode is usually used complex values of variables that are not included in the time parameter, while for the analysis of transients operate with instantaneous values. Because of the two different expressions for the theoretical analysis of the variables, as noted by S. Yamamura, it is non-compact and carries great difficulties and inconveniences. The author introduces the helical vector that is an exponential function of time with the coefficient of the complex argument. The author also offers seven theorems, providing performance CB method. Thus, CB method simplifies and facilitates the solution of circuits, and allows you to immediately get a general solution containing steady and transient components. Finally, there is the approach of the joint solution of the equations of the electromagnetic field and chains. This does not need to use the parameters of the concept of electric cars, to carry out the conversion to the coordinate axes, making any assumptions. Obviously, when changing the picture of the blood pressure of the electromagnetic field is changing, and with it change and values of the equivalent circuit. In other words, the real machine parameters are non-linear. In general, the attributes of AD can be variable. Thus, for example, winding resistance change due to heat, resistance and inductive resistance of the rotor winding - due to the effect of displacement current, moreover, inductive resistance depends on the saturation of the magnetic circuit. Many authors in the modeling BP neglected to simplify the calculations by changing the parameters during the transition process. It is usually taken as equal to the parameters of blood pressure parameters of the test mode. For example, for the study of stationary steady state parameters used to determine the shock value of the electromagnetic moment and current - parameters of start-up mode.

The assumption of the constancy of the parameters greatly simplifies the study, but often leads to incorrect results. Therefore, for more accurate modeling of the transition process must take into account changes in parameters. According to I. Kopylov, two possible approaches to the analysis of the equations of electromechanical conversion equations. One of them is that in the

equations used instead of constant coefficients nonlinear coefficients. The second approach is to replace the non-linear equations with coefficients countless number of linear equations with constant coefficients, t. E. A significant complication of the system of differential equations. This is explained by the fact that at least one non-linearity coefficient in equations electromechanical energy conversion, gives rise to an infinite range of harmonics.

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History knows of attempts by some researchers to propose the simulation of blood pressure changes in their accounting methods parameters. Thus, for example, it is considered in the saturation of the magnetic circuit by way of the main magnetic flux. The inductive reactance of mutual submitted consisting of two parts: a constant part of which is independent of the saturation and variable, depending on the value of the magnetizing current. The variable part of the resistance to the mutual convenience of the authors expressed as a function of flux. To determine this dependence invited to take static magnetization curve of the machine. The described method allows for a change in the mutual inductive reactance and the change in the leakage inductance of the windings is disregarded. In addition to modeling the dynamic mode data are used static magnetization curve that is in doubt. Finally, there is a need of an experiment, it is not always possible. In addition, the researchers there is no consensus about the nature of the physical processes occurring at the time of start-up of blood pressure, and their impact on the parameters of BP.

All authors rightly believe that at the time of start-inductive resistance of the windings are reduced scattering due to saturation. Furthermore, under the effect

of displacement current resistance of the rotor is increased, and the inductive reactance of the rotor leakage decreases. This focus on sufficiently detailed work Emde and Field's, which were later developed Livshits, Garrick.

As for the mutual inductive reactance, then there is no consensus. It is also not known how the parameters behave during the transition process, and how they ultimately affect the change in the character of the transients.

For example, IP Kopylov said that when starting inductances and the mutual scattering are reduced by 30-40%. This would correspond to a saturation point of magnetic circuits of the engine start as the scattering path, and the path of the main magnetic flux.

On the other hand, the authors rightly believe that short-circuited magnetic circuit AD by way of the main magnetic flux is not saturated. While the physical processes occurring during the start-up of blood pressure and short circuit have the same essence.

These differences can be explained by the fact that the researchers were not able to calculate the field pattern in the cross section of BP in various modes and draw appropriate conclusions. Modern software tools and methods allow you to do this.

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