MATHEMATICAL MODEL OF THE ASYNCHRONOUS ENGINE MANAGED AFTER TENSION IS FOR STATISTICALLY OPTIMAL SYNTHESIS OF CLOSE SYSTEM OF ELECTRIC DRIVES

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One of ways of removal of negative consequences of casual character of change of moment of loading of asynchronous drives and increase of efficiency of their work there is creation of close system of electromechanics, that by means of the regulators can render active influence on transient and dynamic квазістали behaviors of work. The electromechanics of working machines, that have considerable casual vibrations of moment of loading and does not need adjusting of speed large range, are prospected in this work. The indicated terms are answered by close system of electromechanic a "transformer of tension is an asynchronous engine" with a regulator optimal on the criterion of a minimum of середньоквадратичної error of adjusting at the action of the stochastic loading - statistically by an optimal regulator.

An aim of researches is development of матеметичної model of asynchronous engine for the statistically optimal synthesis of asynchronous drives.

Materials and methodology of researches. Mathematical models of asynchronous engine, that most full describe dynamic office hours [1], it is nonlinear, that does impossible their application at the use of analytical methods of statistical synthesis of optimal regulators of asynchronous drives after the system "a transformer of tension is an asynchronous engine" after external stochastic indignation.

In [2] shown, that a mathematical model of asynchronous engine can be linearized on a working area it mechanical description by decomposition of nonlinear members of differential equalizations of complete dynamic model in the row of Тейлора. Then equalization of electric part of asynchronous engine in a statement form can be given in a next kind:

$$(1+T_e s)M(t) = \frac{2M_k}{\omega_0 s_k}(\omega_0 - \omega(t)), \qquad (1)$$

where is a critical moment of engine; it is the critical skidding of engine; - electromagnetic permanent to time; it is inflexibility of mechanical description of asynchronous engine.

Equalization of mechanical part of electromechanic in a statement form has such kind:

$$Js\omega(t) = M(t) - M_c(t), \qquad (2)$$

where is a total moment of inertia of electromechanic.

Considering the initial size of engine as an element of the automatic system angulator of appeal, an entrance managing action - angulator of appeal of idling, by an entrance revolting action is a moment of loading, from equalizations(1) and(2) will get common equalization of electric and mechanical parts of asynchronous engine, except an intermediate variable - electromagnetic moment :

$$T_e T_M s^2 \omega(t) + T_M s\omega(t) + \omega(t) = \omega_0 - \frac{1}{\beta}(1 + T_e s) M_c(t), \qquad (3)$$

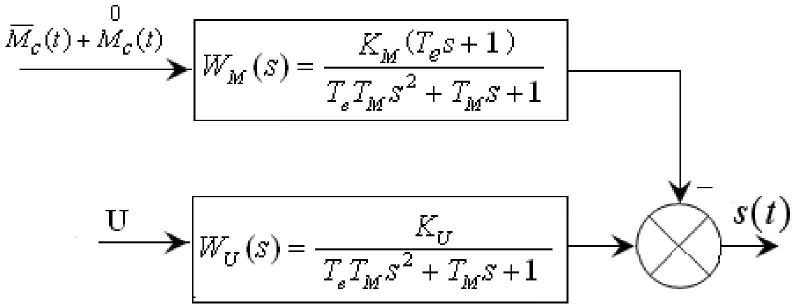
where - electromechanics permanent to time of asynchronous engine.

The entrance managing action of engine in composition of close system "a transformer of tension is an asynchronous engine" is tension of feed of статора. Inflexibility of mechanical description of engine changes at the change of tension, that is why in transition from a managing action as velocity of circulation of idling to the managing action as tension of feed this change of inflexibility of mechanical description it follows to take into account a coefficient transmissions after tension(by a transmitivity after a managing action)

$$K_U = \frac{1}{\beta_{npup}} \frac{\Delta\beta}{\Delta U}, \qquad (4)$$

where β_{npup} is inflexibility of natural mechanical description; $\frac{\Delta\beta}{\Delta U}$ is a sensitiveness of change of inflexibility of artificial mechanical descriptions of asynchronous engine $\Delta\beta$ to the change of tension ΔU, that is determined by the receipt of family of artificial mechanical descriptions at the different values of tension of feed by means of complete dynamic mathematical model and further determination of dependence of inflexibility of artificial mechanical description from tension of feed of stator $\beta = f(U)$ and linearizing of this dependence. Inflexibility of artificial mechanical descriptions for working areas was determined as $\beta = \frac{dM}{d\omega}$.

Results of researches. According to expressions(3) and(4) the linearized mathematical model of the asynchronous engine managed after tension can be given as a flow diagram(rice).



Flow diagram of the asynchronous engine managed after tension

As in the mode of optimization of energy consumption the controlled size of the system "a transformer of tension is an asynchronous engine" is skidding that it follows to support at optimal level, in this flow diagram it is shown an initial size self skidding, but not angulator of appeal .

Taking into account, that the flow diagram of the asynchronous engine managed after tension is got needed for a synthesis statistically of optimal regulator of the reserved electromechanic that is under the action of the casual loading, an entrance revolting action - moment of loading is given as a sum of mean value and centred casual process, of fluctuation of vibrations of that take place round this mean value . The recreation of realization of the centred casual process with the set statistical descriptions can be carried out as a result of passing of "white" noise through some dynamic system that got the name "forming filter", structure and the parameters of that are determined by the type of casual process [3]. Such approach allows to use the methods of optimal synthesis of the linear stochastic dynamic systems to the данного class of electromechanics [4].

Conclusions.

The linearized is offered on the working areas of artificial mechanical descriptions the mathematical model of the asynchronous engine managed after tension allows to apply methods statistically optimal synthesis of asynchronous drives after the system "a transformer of tension is an asynchronous engine" at operating on them of the stochastic loading.

List of literature

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