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ESEARCH OF ELECTROMAGNETIC PROCESSES IN PERMANENT MAGNET SYNCHRONOUS MOTORS BASED ON A "ELECTRIC CIRCUIT - MAGNETIC FIELD" MATHEMATICAL MODEL

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Abstract

In the article methods of mathematical modeling are used to study electromagnetic processes in synchronous machines with permanent magnets. A "electric circuit - magnetic field" mathematical model has been developed, in which the rotor rotation is strictly taken into account, and on the example of a frequency-controlled traction synchronous motor with permanent magnets, the time dependences of its currents and electromagnetic moment for various supply voltage are obtained. It is proved that the assumption of sinusoidal currents in

motor windings, which is usually adopted in field mathematical models, leads to significant design errors. It is shown that A "electric circuit - magnetic field" mathematical model, in which the input data is the specified power supply voltage functions, reflect the actual distortion of the stator winding current that occurs even with sinusoidal supply voltage. It is concluded that "electric circuit - magnetic field" mathematical models provide more adequate simulation results and are universal, since they allow simulating electromagnetic processes in electric machines when powered by any non-sinusoidal sources, which is important for AC traction motors that are powered by a converter frequency. References 7, figures 10, table 1.

Key words: synchronous motor, permanent magnet,"electric circuit - magnetic field" mathematical model.

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