TRACTION ASYNCHRONOUS DRIVES OF NOVEL TYPE FOR RAILWAY TRANSPORT

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The prospects for the use of multiphase (i.e. having the number of phases more than four) asynchronous drives in the field of railway transport were presented and described by the authors of this work in [1-5].

However the increase of the phase number of asynchronous electric drive system allows not only to improve a number of its technical-and-economic characteristics, but also to create the electric drive systems differing fundamentally from the existing ones and having more simple design and control unit, and less energy losses (in comparison with analogous existing drive systems). These asynchronous drive systems of novel type are based on the multiphase non-traditional controlled induction motors.

The basic principles of design of these induction motor drive systems of novel generation are presented in this paper. These basic design principles are the following:

1) the increase of asynchronous drive system phase number more than four;

2) the application of such non-traditional method by motor control as the phase-pole method (PPM);

3) the use of a number of non-traditional design versions of multiphase induction motor.

PPM-controlled multiphase induction motor is in effect a multi-speed motor having only one winding set that is equal (in its complexity) to the winding set of 3-phase single-speed induction motor.

Because of this there is no need to use a transistor inverter in such drive system. The corresponding thyristor or electromechanical commutator is used in the drive system of novel type instead transistor inverter. The operating frequency of such commutator is much less than the operating frequency of above mentioned inverter IGBTs. Owing to this the energy losses are much less and the motor control process is significantly simpler in the multiphase asynchronous drive system of novel generation (in comparison with the analogous existing drives).

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