

Electromechanical converters for electric vehicles

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Abstract. The paper presents the analysis of various constructive schemes of synchronous electromechanical converters with permanent magnets fixed on the rotor and asynchronous with the short-circuit rotor. Various electrical stator winding schemes have also been compared, demonstrating the efficiency of copper utilization in toroidal windings. The electromagnetic calculus of the axial machine has particularities compared to the cylindrical machine, in the paper is presented the method of correlating the geometry of the cylindrical and axial machines. In this case the method and recommendations used in the design of such machines may be used.

1. Introduction

Electromechanical converters - electric cars are increasingly being implemented in terrestrial and air transportation.

An attempt is made in the paper to develop an electromechanical converter designed to drive an electric or hybrid vehicle. The purpose of the research is to analyze several constructive schemes capable of efficiently achieving the electric drive of the vehicle. From the start the analysis of the converters was oriented towards the research of the machines with axial magnetic flux, excluding the classic machine with cylindrical construction.

The construction of two-rotor electromechanical converters eliminates one of their main drawbacks by compensating the axial forces of interaction between the stator and the rotors. These electric machines can be made with one winding on the stator package or with two independent flat windings.

As a result of the analysis, an experimental sample was made with cast aluminum rotor windings. In this construction, additional elements were introduced to save the electrotechnical steel and evenly distribute the magnetic induction from the air gap and the stator yokes. Analytical correlations have been established between the basic geometric dimensions of the axial and cylindrical machine.

2. Electromechanical converters of various executions

Electricity is the most efficient and convenient form of energy for transport and use. The basic element in this energy transformation process is the electric machine, capable of functioning as a generator or motor.

The accelerated development of new electrical device manufacturing technologies has also influenced parameters improvement, reduced active and constructive materials, and the appearance of the electric machine [1].

