DOI: https://doi.org/10.15407/techned2020.02.028

ELECTRIC MACHINE WITH AXIAL MAGNETIC FLUX, PERMANENT MAGNETS AND MULTILAYERED PRINTING WINDINGS

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 2, 2020 (March/April)
Pages	28 - 35

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Abstract

The use of printed windings in electric machines with permanent magnets and axial magnetic flux allows to reduce their axial size and significantly to increase the current density in the windings. Experimental studies of printed windings for heating confirmed that at a current density of J = 22 A / mm^2, the steady-state temperature of the printed windings does not exceed 80 °C. For given dimensions of an electric machine with axial magnetic flux, permanent magnets and multilayer printed windings (outer diameter of the stator, axial length of the stator), numerical studies were carried out and the optimal thickness of the permanent magnets was determined at which the maximum value of the electromagnetic torque is reached. Also, as a result of numerical studies, it was found that the presence of teeth on the stator allows you to increase the electromagnetic torque of the electric machine by about 25% compared with the version of the magnetic system without teeth on the stator. A prototype of an electric machine with multilayer printed windings was made and the dependences of voltage and power in the generator mode were determined when connecting the windings through the rectifier diode bridge to the active load. The computational model of the generator adequately describes the

physical model. The difference discrepancy between the calculated and experimental values does not exceed. It is shown that the average difference discrepancy between the experimental and calculated values does not exceed ε=5.5%. The characteristics of the studied generators are calculated in the Simcenter MagNet and Simcenter MotorSolve software packages.
References 10, figures 7, table 1.

Key words: permanent magnets, printed windings, electromagnetic torque, external characteristics, experimental sample.

Received: 10.01.2020
Published: 26.02.2020

The work was performed on the budget theme "Development of scientific bases and development of principles of construction of electromechanical energy converters with permanent magnets and magnetic reducers". State registration number No 7/7 / 3-135 of 04/25/2019.

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