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Tue-Af-Po2.21-11 [74]: Optimization Design of Segmented Permanent-Magnet Shape by Analysis of Thermal Characteristics

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The brushless direct current motor (BLDC) is considered as the most suitable model to satisfy the characteristics of electric compressors. Segmented permanent magnet was used to improve the efficiency of the electric-driven compressor of electric vehicles motor. It is one of the methods for reducing the eddy current loss. The thermal characteristics of the motor are analyzed according to the change of the eddy current loss. Thermal analysis for partial thermal distribution will be analyzed using CFD program. Irreversible demagnetization characteristics are different according to permanent magnet shape. In this paper analysis of eddy current loss and demagnetization characteristics of permanent magnet according to segment type. The maximum efficiency was analyzed by consider the shapes of various magnets. The simulation is performed using a permanent magnet divided horizontally and vertically. The irreversible demagnetization characteristics of magnets, which is one of the factors that determine the performance of a motor, should be carefully analyzed and designed. The occurrence of irreversible demagnetization in a permanent magnet can be largely divided into two types: an external demagnetization field and demagnetization phenomenon by temperature change. In this paper, an optimum model which is considered minimizes the vibration, eddy current loss and irreversible demagnetization according to the segmented of permanent magnet is proposed. So we studied optimal design after analyzing the characteristics of demagnetization at external magnetic field and high temperature and we analyze the eddy current loss reduction according to the shape of the segmented magnet. Back_EMF was compared to analyze the permanent magnet demagnetization ratio. Also, resonance frequency is analyzed through simulation of modal analysis and harmonic response. The ANSYS Electromagnetic Suite 19.0 was used to analyze irreversible demagnetization under driving conditions.

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