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# Mon-Af-Po1.21-04 [91]: A study on Improvement of Power Density and Efficiency of Permanent Magnet BLDC motor

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1) Introduction
Brushless DC motor (BLDC) have wide operating range and can high power density and high torque. Therefore, BLDC is used in various fields such as vehicle, aviation, home appliances. However, there is a problem that a torque ripple occurs in a phase commutation section in which a current flows. In order to overcome such problems, various studies have been conducted to improve the power characteristics of the BLDC motor.
2) body
In this paper, a study on power density and efficiency improvement of permanent magnet brushless DC motor (BLDC). In general, there is a way to improve the power characteristic of the motor by increasing the main flux of the permanent magnet. Applying the halbach magnet array structure not only increase the magnetic flux, but also reduces the coreless of the motor. Also, the inner rotor type motor has a simple radiating structure for the reducing thermal loss generated in the teeth of the motor. Therefore, it is superior in terms of reduction of thermal loss compared to the outer rotor type motor. On the other hand, outer rotor type motor has motor magnet usage than inner rotor type motor. Therefore, outer rotor type motor can improve torque and efficiency compared to inner rotor type motor for the same size. In order to verify this, the inner rotor type motor and the outer rotor type motor with the same size and power were designed. Also, the electronic and thermal characteristic of the two motors were analyzed through the finite element analysis (FEA).

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