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Abstract
The traditional alternators for automobiles are 12V claw-pole systems. Due to the structure constraint, the efficiency is low and the capacity is limited to 2kW. As the luxury equipment for high-level cars are concerned, the traditional alternators can not be adequate.

Limited in the same structure size of traditional alternators, this thesis use the permanent-magnet brushless alternator to replace the claw-pole ones, and promote the voltage to 42V to produce a higher efficiency. Before design the alternator, we should confirm the operation environment, conditions, and the rating voltage, speed and output power. Then we perform the simulation analysis of magnetic circuit, electric circuit. Adding the predefined size, weight and cost evaluation, a optimal design is conducted.

By using finite-element software, we analyze the magnetic path of this alternator module, and build the feature model. The simulated data are compared with the traditional claw-pole alternators. The voltage regulation, output power and efficiency are also investigated.
Advisory Committee Cheng-Jyi Mao - advisor

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