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Tue-Af-Po2.21-02 [66]: Thermal-Electromagnetic Design of ISG WFSM Motor for Vehicle Considering Cooling System

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In recent years, researches on high output and high efficiency of electric devices in all industries have been actively carried out due to strengthened regulations on energy consumption and environmental pollution worldwide.
In order to achieve high power efficiency and high efficiency in the motor industry, it was mainly used for rare earth motors using rare-earth magnets with high energy density. However, demand for derealization studies is underway due to the large amount of environmental pollution wastewater and pollution occurring in rare earth-containing mineral extraction and rare earth separation processes during the production of rare earth materials.
The motor design should be done with multi-physics design such as heat, electromagnetic field and rigidity.
The use of WFSM(Wound Field Synchronous Motor) in automotive electric motors is increasingUnlike other motors, the WFSM has coils in the field. The coil is the most heat-generating element in the motor.
The ISG motors have operating characteristics of Starting, Assisting and Generating, and Starting has high instantaneous power. If a high current flows, a high temperature is generated, which may cause deterioration of the performance of the motor.
This paper shows Thermal-electromagnetic design of ISG WFSM design. ISG Motor has each cooling system. According to cooling system, maximum calorific value is decided. The amount of heat generated by the current can be calculated through an thermal equivalent circuit, and the electromagnetic field can be designed based on this calculation.

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