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Mon-Mo-Po1.07-10 [85]: Optimized design of segmented magnet considering demagnetization and vibration analysis of IPMSG for ISG

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In this paper, the demagnetization and vibration characteristics of a 48V 5kW BLDC ISG motor generator are analyzed according to the magnet segments. Particularly, permanent magnet is divided into 3 segments and 7 segments as a comparison model. According to the operation characteristics of the ISG, the driving area was divided into three areas: motoring 3000rpm, power generation area 4000rpm, and 16500rpm. In general, electrical equipments of the vehicle are very sensitive to vibration characteristics and ISG is attached to the engine part of the vehicle, so specifications are given to minimize vibration. In addition, the high output ISG has a very high driving current, which causes a risk of irreversible demagnetization. And We apply various driving current ranges that can generate irreversible demagnetization. In addition, the characteristics of demagnetization and eddy current depends on the lamination type of the inserted magnet in the rotor, so this is mainly compared and analyzed. We analyze how does the stacking of magnets in the fractional slot winding method affects the eddy current loss reduction. and then Modal analysis and harmonic analysis are performed for vibration characteristics analysis and resonance frequency is found. The demagnetization phenomenon and vibration of laminated magnets are analyzed by 3D simulation. In order to analyze the effect of the irreversible demagnetization of the laminated magnets on vibration, we used mechanical Co-simulation technique. In this research, analysis was carried out using ANSYS EM and WORKBENCH. Based on the results, the optimization design was performed. In order to verify the results of this analysis, various types of magnets were made and a comparison test was conducted using various types of magnets. so we are willing to show program analysis data and experimental data.

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