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A study on Double Layer V-Shape Magnet Type IPMSM design in view of demagnetization

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Among the various industries, the use of IPMSM in electric vehicle is increasing.In particular, in the case of an electric vehicle drive motor, the mechanical strength of the rotor is important because it operates in a high-speed operation region.Therefore, the double layer V-shaped magnet type IPMSM is more widely used in electric vehicles currently selling, because the double layer V-shaped magnet has better mechanical strength than other shapes. However, in the case of a double layer V-shaped magnet, the total magnet amount is similar to other magnet shapes, but it is thinner than the thickness of one layer magnet because it is composed of two layers. Since the thickness of the magnet has a great influence on the demagnetization, it can be seen that the double layer V-shaped magnet made of two layers is vulnerable to demagnetization. Therefore, in this paper, we study the design method of the double layer V-shaped IPMSM considering such characteristics. First, we study the demagnetization characteristics of double layer V-shaped IPMSM. We will study how the characteristics of the demagnetization vary depending on the operating point and how to change it according to various design parameters such as the position and size of the magnet. Second, based on the above research, we will study a design method that prevents demagnetization. In most cases, the initial design stage does not proceed with design considering demagnetization, but proceeds to find a design satisfying a given performance. If a demagnetization problem occurs when analyzing demagnetization characteristics with a design that satisfies the given performance, a detailed design that can prevent demagnetization while maintaining maximum performance is required. Therefore, we want to study design methods to prevent demagnetization of magnets while maintaining overall motor performance.

Submitters Country

South Korea

Authors: KIM, Jin-Seok (SUNGKYUNKWAN UNIVERSITY); Prof. JUNG, Sang-Yong (Sungkyunkwan Univ)

Co-authors: Prof. KIM, Yong-Jae (Chosun University); Mr LEE, Ji-Han (Sungkyunkwan Univeristy)

Presenter: KIM, Jin-Seok (SUNGKYUNKWAN UNIVERSITY)

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