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A Study on the Effect of Rib Structure in Spoke-Type PMSM

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Abstract : Rotor of Spoke-Type PMSM is divided into permanent magnet and rotor core. Moreover, rotor core is composed of pole-piece, Bridge and rib. Piece between the permanent magnet N and S poles is pole-piece. Bridge and rib hold pole-piece. In the case of pole-piece and bridge, it is essential structure of Spoke-Type PMSM. However, Rib can be selected by the designer depending on the operating conditions and constraints. If rib is present in the rotor, rib which acts in the leak path generates a leakage flux. Although the leakage flux reduces the torque in low speed, it expands speed range in high speed. So, there is a relationship of trade off. Viewed from the standpoint of permanent magnet demagnetization, since the magnetic flux by the stator winding leaks to the rib, it is an advantage. In addition, rib affects the safety factor of the rotor. For application required high speed operation, since the securing the safety factor of the rotor is important, rib structure is advantageous. On the other hand, in the case of the application that does not require high speed operation, it is desirable to increase the output power by designing without rib. In this paper, Effects on rib structure is analyzed in detail and this paper provides designer with information about rotor design of spoke-type PMSM according to rib structure.

Keywords : spoke-Type PMSM, rotor shape, rib, operation range
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