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Tue-Af-Po2.21-09 [72]: Study of A Post-Assembly Magnetization Method of a V-Type Rotor of Interior Permanent Magnet Synchronous Motor for Electric Vehicle

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The interior permanent magnet synchronous motor (IPMSM) has a promising prospect in electric vehicle because of its advantages of high power density, high torque density, high efficiency and good flux weakening ability. With the improvement of motor power and performance, shaped permanent magnet (PM) pole rotors like V-type, U-type and other structures appear. The device complexity and assembly cost of traditional manufacture process which magnetizing the PMs before assembly significantly increase, together with the risk of PM damage during the process. Post-assembly magnetization method can properly overcome these difficulties with its advantages of simple installation, low cost, high safety and in-situ magnetization or demagnetization, etc. In this paper, a 50kW 8 poles 48 slots V-type IPMSM rotor for electric vehicle is selected as the prototype. An auxiliary stator type magnetizing fixture is designed to magnetize the IPMSM rotor after assembly. The needed magnetizing field configuration and minimum field intensity for saturated magnetization are calculated. The influence of saturation of silicon steel sheet and eddy current in PM during magnetization process are analyzed, according to which the parameters of the magnetizing system are optimized. The prototype experimental results are in good agreement with finite element simulation results, which indicate that the needed magnetizing field configuration and field intensity can be obtained by the designed magnetizing system, i.e., the post-assembly magnetization of the IPMSM rotor can be realized.

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