Project 7:

Design And Analysis of Permanent Magnet Synchronous Machine Using Ansys Software

Abstract

This study's objectives were to build a three-phase, highly efficient surface mounted permanent magnet motor with a power output of 7.5kW and a speed of 1500rpm, as well as conduct electromagnetic and noise-vibration analyses of the motor. Basic analytical formulas were used to determine the motor's original design geometry. The electromagnetic analyses of this first design geometry were thoroughly examined. Cogging torque, torque ripple, losses, and efficiency metrics have all been studied in these electromagnetic analyses. Subsequently, modal, and harmonic analyses were conducted to assess the impact of radial harmonic forces on the stator teeth, as determined by electromagnetic analyses, on the motor's noise and vibration parameters. It was intended to reduce cogging torque, torque ripple, efficiency, noise, and vibration parameters, according to the analysis results of the first designed motor. The cogging torque improvement experiments are anticipated to have a good impact on the motor's vibration and torque ripple as well. New motor geometry has been obtained by optimizing research made on the magnet and lamination geometries. This innovative motor geometry underwent analyses on the electromagnetic, modal, and harmonic fronts. Analytical outcomes for the new design and the original design were compared.

Ansys Design