

Optimal design of SMPMSM using Genetic Algorithm based on Finite Element Model

Abstract

This paper deals with an optimal design of a surface-mounted permanent magnet synchronous machine (SMPMSM) using a genetic algorithm (GA) method. To analyze the characteristic of permanent magnet (PM) motors, the classical optimization method, such as the finite element method (FEM), is intensively used. In this design, a three-phase 12-slot/8-pole PM motor is established with FEM with radial magnetization pattern. Then, the GA is used to search the optimality of SMPMSM machine design. In the final analysis, the optimal new design of SMPMSM is demonstrated by comparing it with the initial design that is investigated by FEM. The result of induced back-EMF, total harmonic distortion, and magnetic flux density of optimal design are compared with the initial design to show the advantages of GA optimization method.

Keywords

Finite element; Genetic algorithm; Optimal design; Permanent magnet synchronous machine; Surface-mounted