Partitioned Topologies of Switched Flux Permanent Magnet Machines for Electric Vehicles

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Abstract

Partitioned Stator (PS) and Partitioned Rotor (PR) Switched Flux Permanent Magnet (SFPM) machines have the advantages of high torque density and high torque per PM volume compared with conventional SFPM machine. These advantages are considered important potentials for Electric Vehicles. This paper aims to provide a comparative study between recent PS and PR topologies using 2D Finite Element Analysis (FEA) modeling software. Two recent topologies of PS-SFPM machine, namely the Cylindrical Inner Stator (CY) and the Salient Inner Stator (SA), are compared with the topologies of PR-SFPM machine, namely the Parallel magnetic circuit (PA) and the Serial magnetic circuit (SE) PR-SFPM machines. To have a fair comparative study, all these topologies have the same main dimensions and the same PM volume. Also, they have been optimized under the same conditions using FEA optimization tool. It is found that the PA PR topology has the best torque performance, in the meantime, the PS topologies have higher power density, and better flux-weakening capability.

References


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Keywords

Electric Vehicles, Switched flux PM, Partitioned rotor, Partitioned stator.