DESIGN STUDY OF 12S-10P FIELD EXCITATION FLUX SWITCHING MOTOR FOR HYBRID ELECTRIC VEHICLE

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ABSTRACT

This paper presents a new structure of 12slot-10pole field excitation flux switching motor (FEFSM) as an alternative candidate of non-Permanent Magnet (PM) machine for HEV drives. Design study and analysis of field excitation flux switching machine with non-rare-earth magnet for hybrid electric vehicle drive applications has been analyzed. The projected motor has a robust structure and suitable for high speed application as the rotor consist of only stack of iron and all the windings are located at the stator. The design target is a machine with the maximum torque, power and power density more than 200Nm, 100kW and 3.5kW/kg, respectively, which competes with interior permanent magnet synchronous machine (IPMSM) used in existing hybrid electric vehicle. Some design feasibility studies on FEFSM based on 2D-FEA and deterministic optimization method has been applied to design the proposed machine. The proposed machine have achieved the target requirements that are average torque, power and power density of 200.3Nm, 108kW and 4.5kW/kg, respectively, better compared to existing IPMSM, suitable for HEV.

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