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## **Tue-Af-Po2.20-11 [63]: A Novel Flux Switching Claw Pole Machine with Soft Magnetic Composite Cores**

*Tuesday, 24 September 2019 14:00 (2 hours)*

Flux switching permanent magnet machine (FSPMM) is a new permanent magnet machine, with installing permanent magnet (PM) in between of adjacent stator tooth to form good flux concentrating structure and there is no windings or PMs on rotor core. Claw pole machine (CPM) is a special kind of transverse flux machine (TFM), compared with TFM the CPM can have higher torque ability and power factor, as the adopted claw pole teeth can help CPM use more PM fluxes and reduce the flux leakage ]. With the advent of soft magnetic composite (SMC) material, the manufacturing process of CPM with SMC cores can be much easier. Combining the above two machines and new material, this paper proposes a novel flux switching claw pole machine (FSCPM) with soft magnetic composite (SMC) cores. The proposed FSCPM has both advantages of flux switching permanent magnet machine (FSPMM) and claw pole machine (CPM) with SMC cores. Specifically, with permanent magnet (PM) installed between the stator claw pole teeth, FSCPM can have merit of good flux concentrating characteristic thus the air gap flux density can be improved greatly. As the applied claw pole teeth and global winding, the torque coefficient of FSCPM is relatively high. The mechanical robust ability of FSCPM is quite good due to there is no windings or PMs on rotor core. The core loss of FSCPM at high operation frequency is relatively low for the SMC material has lower core loss properties at high frequency compared with silicon steels. The topology and operation principle of FSCPM are explained at first. To seek better performance, the main dimensions of FSCPM are optimized. Finally, the main parameters and performance of FSCPM are calculated based on 3D finite element method (FEM).

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