Edge-rounded magnet poles for reducing the torque ripple on a radial flux inset permanent magnet generator

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Abstrak

This study reports a novel strategy for minimizing torque ripple in a radial flux inset permanent magnet (RFIPM) generator by using a geometric modification of the magnet poles. We simulate the design of three different types of edge-rounded magnet (ERM) poles using finite element method magnetics (FEMM) software for a 16 poles and 24 slots RFIPM generator. We found that the edge-rounding of magnet poles significantly lowered the torque ripple of the generator with a reduction of about 74% (torque ripple of 7.76%). In addition, the modified RFIPM generator exhibited enhanced flux density uniformity in the air-gap of the generator (up to ~ 48.8%), leading to a smoother line of flux density.