

Performance comparison of spoke and hollow-rotor permanent magnet generator for small energy harvesting application

ABSTRACT

This paper presents performance comparison between spoke type and hollow-rotor permanent magnet generator (PMG) that could be used for low speed energy harvesting application. In this application, the requirement for such generator would be higher power density due to the limitation of space, volume and weight. The drawback of spoke type PMG is the flux leakage at end of the permanent magnet that embedded inside the rotor. Meanwhile, the hollow-rotor PMG introduces a hollow segment that obstructs the flux from flowing at the end of the permanent magnet. This new arrangement maximizes the energy that contributes by the permanent magnet. The objective of this paper is to compare the performance of both PMG in term of output power and speed at various load condition. In this research finite element analysis is used for modelling and simulating the PMG performance. For final comparison, power density is used for evaluating the best performance and the result shows that the hollow-rotor topology has higher power density compared to spoke type PMG. In the end, this paper provides an overview about the advantage of hollow-rotor topology that could be used for small energy harvesting application.

Keyword: Permanent magnet generator; Spoke type; Hollow-rotor