Power density evaluation of a novel double-stator magnetic geared permanent magnet generator

ABSTRACT

This paper presents the power density evaluation and power mapping performance of a novel magnetic geared double-stator permanent magnet generator (DSPMG) which is proposed to address problems of mechanical geared generators for low-speed power generation applications. The operating principle is based on three PM rotors consisting of prime permanent-magnet (PM) poles in the middle rotor and field PM poles in the inner and outer rotors respectively. To evaluate the power density performance, a 2-D finite-element method (FEM) is used to predict the performance of the generator, and a demonstrator prototype is fabricated and evaluated experimentally. The power density characteristics of the proposed generator are analyzed and reported. The measured results agree closely with the simulated ones to verify the validity of the magnetic geared generator design. Finally, a measurable comparison is conducted with other published prototype magnetic gear machines to demonstrate its benefits of higher power density and smaller volume size.