Open circuit V-I characteristics of a coreless ironless electric generator for low density wind power generation

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ABSTRACT
Cogging is an attraction of magnetism between permanent magnets and soft ironcore lamination in a conventional electric ironcore generator. The presence of cog in the generator is seen somehow restricted the application of the generator in an application where low rotational torque is required. Cog torque requires an additional input power to overcome, hence became one of the power loss sources. With the increasing of power output, the cogging is also proportionally increased. This leads to the increasing of the supplied power of the driver motor to overcome the cog. Therefore, this research is embarked to study fundamentally about the possibility of removing ironcore lamination in an electric generator. This research deals with removal of ironcore lamination in electric generator to eliminate cog torque. A confinement technique is proposed to confine and focus magnetic flux by introducing opposing permanent magnets arrangement. The concept is then fabricated and experimentally validated to qualify its no-load characteristics. The rotational torque and power output are measured and efficiency is then analyzed. Results indicated that the generator produced RMS voltage of 416VAC at rotational speed of 1762 RPM. Torque required to rotate the generator was at 2Nm for various rotational speed. The generator has shown 30% lesser rotational torque compared to the conventional ironcore type generator due to the absent of cogging torque in the system. Lesser rotational torque required to rotate has made this type of generator has a potential to be used for low wind density wind turbine application.

KEYWORDS:
Electric power generation; Laminating; Permanent magnets; Timing circuits; Torque; Wind power; Wind turbines