

Performance Assessment of Motor/Generator System for 5kWh SFES

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A SFES(Superconductor Flywheel Energy Storage System) is an energy storage equipment which can be used by converting midnight electrical power stored as rotational energy to electrical energy. It can be used for load equalization through midnight power storage, uninterrupted power supply and storage of distributed resources such as solar power and wind power by environment-friendly energy storage system which is cope with a change of power demand and is capable of distributed placement near to demand point.

In this paper, a motor/generator system, which plays a part in energy conversion, was designed, manufactured and applied in 5kWh SFES, and its performance was tested. A slotless ring-wound type motor/generator was selected taking into account possible eddy current loss and heat loss due to slot ripple. A topology for the power converter which allows control of the power factor and DC voltage through the PWM Boost converter and also allows control of the high speed drive of the motor/generator through full bridge inverter, was selected. In addition, the rotational speed of the flywheel was measured using a hall sensor to obtain the exact position and speed information needed to supply sinusoidal current to the motor.

The high speed drive test was performed under no-load conditions for motoring mode and the induced EMF was measured. A load test in motoring mode was performed after constructing the 5kWh SFES system. The line voltage and the phase current of the inverter were measured to confirm the cycle of the input current, the power consumption of the inverter and the correct drive of the motor.

keywords : SFES, motor/generator, hall sensor, PWM