

Study on Heat Generation of a Bulk HTS for Application to a 100kWh SFES Superconductor Bearing

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This paper presents experimental and numerical investigation on heat generation of a bulk HTS for application to a 100 kWh Superconductor Flywheel Energy Storage System (SFES) bearing. An experimental device is manufactured to reproduce the varying magnetic field conditions that a bulk HTS may experience during the operation of the 100 kWh SFES. The bulk HTS is directly cooled by a cryocooler while heat is generated by the eddy currents created by varying magnetic fields induced by a coil. In order to confirm the design of the cryocooling system for the 100 kWh SFES project, a preliminary experiment to investigate the actual cooling load variation under AC magnetic field is carried out. In the experiment, two different copper holders are designed and tested. Several temperature sensors are installed on each component of the assembly and the temperatures are measured for several operating conditions of the 100 kWh SFES. The experimental investigation on the thermal response of the bulk HTS and its holder is a valuable step in the successful materialization of a large-scale SFES.

Keywords : 100 kWh SFES, bulk HTS, superconductor bearing, magnetic field