Evaluation of High Temperature Superconductor Bearing Stiffness for 10 kWh Superconductor Flywheel Energy Storage System

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A superconductor flywheel energy storage (SFES) system is mainly act a electro-mechanical battery which transfers mechanical energy into electrical form and vice versa . SFES system consists of a pair of non-contacting High Temperature Superconductor (HTS) bearings with a very low frictional loss. But it is essential to design a efficient HTS bearing considering with rotor dynamic properties through correct calculation of stiffness in order to support a huge composite flywheel rotor with high energy storage density. Static properties of HTS bearings provide data to solve problems which may occur easily in a running system. Since stiffness to counter vibration is the main parameter in designing an HTS bearing system, we investigate HTS bearing magnetic force through static properties between the Permanent Magnet (PM) and HTS. We measured axial and radial stiffness and found bearing stiffness easily can be changed according to activated vibration direction between PM and HTS bulk. This results are used to determine the optimal design for a 10 kWh SFES

Keywords : SFES, HTS, PM, Stiffness