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Application of Superconducting Magnetic Energy Storage for Transient Stability Improvement of Power System

Content :

This paper presents the impact of Superconducting Magnetic Energy Storage (SMES) for improving the transient stability of large and small power systems. Transient stability is studied and compared for a single machine infinite bus (SMIB) system and a multi machine infinite bus (MMIB) system with SMES. SMES system consists of Superconducting coil, DC-DC chopper, Voltage Source Converter (VSC) and step down transformer. Conventional Proportional-Integral (PI) controller is used to control the SMES for both the systems. Transient stability demands fast active power exchange between SMES coil and power system. This not only requires fast responding VSC and chopper but also needs high stored energy in superconducting coil ($\frac{1}{2} LI^2$) with high current and low inductance. This study helps to understand the desired parametric values of SMES system and variation in performance of SMES system for large and small power systems.

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