

A Study on the Application of a Superconducting Fault Current Limiter for Energy Storage Protection in a Power Distribution System

Won-Sik Moon, Jong-Nam Won, and Jae-Chul Kim

Abstract - This paper presents the application of a superconducting fault current limiter (SFCL) to energy storage for protection in a distribution power system. Although an energy storage system (ESS) adds a number of benefits for power systems, it has a drawback for ground fault protection. These things are interrelated with a neutral grounding method for an interconnecting transformer used to connect the energy storage and power systems. There are different types of transformer connections used to interconnect with a power grid. In particular, a grid-side grounded wye-delta winding connection is prevalent for interconnect generation to the utility system, as well as for all central-station generation. However, there is a path on the negative side of the fault current created in case of a ground fault in the distribution power lines. The ground fault will generally disrupt the coordinated power system protection and subsequently disconnect the energy storage from the grid. Therefore, an SFCL is applied to the interconnecting transformer of energy storage, and its effect is analyzed using transient simulation software.

Keywords - Energy storage, interconnecting transformer, fault current, superconducting fault current limiter.

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