Quench Characteristics of HTSC Elements in Integrated Three-phase Flux-lock Type Superconducting Fault Current Limiter

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In this paper, we investigated the quench characteristics of high-T_c superconducting elements in the integrated three-phase flux-lock type superconducting fault current limiter(SFCL) according to fault types such as the single-line-to-ground fault, the double-line-to-ground fault, the line-to-line fault and the three-line-to-ground fault. The integrated three-phase flux-lock type SFCL was an upgrade version of single-phase flux-lock type SFCL. The structure of the integrated three-phase flux-lock type SFCL consisted of three-phase flux-lock reactor wound on an iron core with the ratio of same turn between coil 1 and coil 2 in each phase. When the SFCL is operated under a normal condition, the flux generated in the iron core is zero because the flux generated between two coils of each single phase is canceled out. Therefore, the SFCL's impedance is zero, and the SFCL has negligible influence on the power system. However, if a fault occurs in any single one of three phases, the flux generated in the iron core is not zero any more. The flux makes HTSC elements of all phase to quench irrespective of the fault type, which reduces the current in fault phase as well as the current of sound phase. It was obtained that the fault current limiting characteristics of the suggested SFCL were dependent on the quench characteristics of HTSC elements in all three phases

keywords : high-T_c superconducting elements, integrated three-phase flux-lock type supercon -ducting fault current limiter, fault types, flux, quench