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Thu-Mo-Po4.11-08 [81]: Analysis of the recovery characteristics of superconducting coupled DC circuit breakers during reclosing operation

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This paper proposes a superconducting coupled DC circuit breaker that combines a superconductor with a mechanical DC circuit breaker for DC fault current interruption. The power burden and damage possibility of superconductors are determined by the recovery characteristics of the superconductor during the reclosing operation of the proposed circuit breaker. They also affect the breaking function of the proposed circuit breaker.
This study analyzed the recovery characteristics of superconducting coupled DC circuit breakers during the reclosing operation. Superconductors RC1, RC2, and RC3 with the same critical current value were modeled and the power burdens of the superconductors were compared during the reclosing operation. The reclosing operation was based on the AC standard duty cycle.
The analysis results confirmed that the breaking time decreased by lees than 15 ms on average and the fault current decreased by 37% on average during each reclosing operation of the superconducting coupled DC circuit breaker. However, RC3 performed the reclosing operation without recovering during the reclosing operation. Due to this recovery characteristic, the power burden of RC3 increased by approximately 30% compared with RC1 and RC2.

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