

Resistive Superconducting Fault Current Limiters for Distribution Systems Using YBCO Thin Films

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High critical current density, high n value, multiple faults endurance, and fast recovery characteristics of YBCO thin films are very attractive characteristics for developing resistive type superconducting fault current limiters. But due to the limited current and voltage ratings of one YBCO module, it is needed to construct series and parallel module connections for high capacity electric networks.

Especially for distribution network, more than 30 units should be connected in series to meet voltage level. So in order to construct distribution-level superconducting fault current limiter, simultaneous quench in one YBCO thin films should be realized, and furthermore, quench should be occurred in all fault current limiting units equally to avoid local heating and failures.

In this paper, we proposed optimum design of YBCO thin films for fault current limiting module and technical method using shunt resistor to achieve simultaneous quench between multi current limiting units. From the analytical and the experimental results, optimal current path and thickness of shunt material was determined for YBCO thin films and shunt resistor between modules was developed. Finally, 14kV one phase resistive fault current limiters using multi YBCO thin films was constructed and it was possible to get satisfactory test results.

keywords : superconducting fault current limiter, YBCO, resistive type, 14kV rating