

HTS Conductor Requirements for Superconducting Fault Current Limiters

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Development of Superconducting Fault Current Limiters (SFCL) and their conductor requirements will be reviewed. An SFCL is a superconducting power machine that controls fault currents by rapid insertion of impedance into the power grid. Among various types of SFCLs, most popularly developed is the resistive one that utilizes the superconductor – normal transition (quench). Because of extraordinarily high current density the conductor is used to be small, therefore, relatively small energy input can induce the transition, providing a unique solution for the fast OFF-switching in the high power circuit. Superconductor requirements for a good switching device are (1) spatial uniformity of J_c as well as the n value for high voltage application, (2) high J_c and high n for fast switching, and (3) scaled production at low price for general application. Currently two major superconductors, $YBa_2Cu_3O_7$ films and $Bi_2Sr_2CaCu_2O_8$ bulks, are under development working at up to 138 kV. We will also discuss switching properties for various superconductors and their metal composites including coated conductors.

keywords : superconductor, superconductor-metal composite, quench, fault current limiter