

Development of New Current Path Pattern of YBCO Thin Films for Superconducting Fault Current Limiters

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High critical current density, high n value and fast recovery characteristics of YBCO thin films are excellent properties for developing resistive type fault current limiters. But the low resistivity during quench condition should be enhanced by adopting effective current path patterns of YBCO thin films for real applications. Furthermore, it is needed to determine the optimum current path patterns of YBCO thin films in order to prevent the distortion caused by overcurrent and overvoltage during quench period.

In this study, electromagnetic analysis of current paths including meander pattern, spiral pattern, and bi-spiral pattern were performed and in order to verify the analysis results, experiments tests including quench test, and insulation tests were performed. In addition, bubble corner concepts were introduced to enhance insulation reliability.

From our study, bi-spiral pattern of YBCO thin films were rather effective for quench and insulation than the other patterns. So this current path pattern was adopted for YBCO thin films in order to develop 6.6 kV resistive fault current limiters. Finally YBCO thin films were connected in series and parallel to enhance capacity, and the test results of current limiting characteristics of 6.6kV resistive SFCL were successful.

keywords : YBCO thin films, current path patterns, Superconducting fault current limiters