Power Switches Utilizing Superconducting Material for Accelerator Magnets

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Abstract—Power switches that utilize superconducting material find application in superconducting systems. They can be used for the protection of magnets as a replacement for warm DC breakers, as well as for the replacement of cold diodes. This paper presents a comparison of switches made of various superconducting materials having transport currents of up to 600 A and switching times of the order of milliseconds. The switches operate in the temperature range 4.2 - 77 K and utilize stainless steel clad YBCO tape and MgB2 tape with a nickel, copper, iron matrix. Results from simulations and tests are reported.

Index Terms—Critical current, HTS, inductive heating, resistive heating

Manuscript received July 31, 2008.
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