Temperature Rise in a Model of Resistive HTS Element of a Fault Current Limiter

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Abstract - We studied the thermal regime of the Ni tape immersed into liquid nitrogen and heated up due to a step-like direct current. The tape cooling after the transport current is switched off has been investigated as well. The aim of this study is to model the thermal regime of a resistive HTS fault current limiter during and after the fault. First, we measured the temporal dependence of temperature rise in Ni tape. An adiabatic approach that is commonly accepted was shown to give a conservative result. The thermal conduction into surroundings is necessary to take into account. This heat transfer mechanism was shown to play also the main role during the cooling. According to our results, the necessary amount of HTS material in a resistive fault current limiter can be significantly reduced if one takes into account the heat transfer to liquid nitrogen.

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