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Numerical study of quench behaviour in YBCO CORC cables

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Conductor on round core (CORC) cables composed of YBCO coated conductors and a former show significance in high current capacity and mechanical flexibility. However, YBCO coated conductors are vulnerable to a local quench, and this disadvantage can affect the thermal stability of the CORC cables. Therefore, this paper first develops a 3D electromagnetic-thermal cable model with the termination resistance considered. Then, we implement a hotpot on one of the superconductors, and the shrinking, the stationary, and the expanding normal zones are respectively observed. The minimum quench energy (MQE) as a function of the transport current to its critical current is investigated. Meanwhile, we are monitoring the current redistribution among superconductors through cable terminals during the quenching process. The MQE with respect to the terminal resistance is to be shown. Finally, we will explore the effect of inhomogeneous terminal resistance on the CORC cable's quench behaviour. The MQE is expected to improve with a decreased transport current and a lower termination resistance.

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