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Comparison of quench behaviors on 2G quasi-isotropic strands made by different metal sheaths and fillers at 4.2 K

This paper numerically compares the thermal stability of geometrically symmetrical strands with different kinds of metal sheaths and fillers at 4.2 K, high field environments. The round configuration strands consist of 80 symmetrical stacked second generation 2G wires, metal material filler and sheath. The sheath and filler can be made by different kinds of metals such as copper, aluminum and stainless steel. Owing to the different thermal properties, different metal sheath and filler within the strand will lead to varying thermal stability characteristics like minimum quench energy (MQE) and quench propagation velocity (QPV). So, it is necessary to choose an optimal strand configuration with larger MQE and faster QPV which is most promising for the low temperature and high field magnet applications. 1D model built by THEA code and 3D electro-thermal homogenous model established by Comsol are both adopted to in the simulation.

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