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Stability and current sharing in YBCO cables – impact of broken elements - FEM modeling

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High field superconducting magnets require a large number of ampere-turn in their windings. To avoid large self-inductances in such magnets they must be wound using superconducting cables. Compared to other currently available HTS cables REBCO Roebel and CORC cables have their strands transposed or twisted which reduces both their ac losses as well as magnetization. This improves field homogeneity and makes the magnets less ramp rate sensitive. Stability and current sharing is crucial in these cables. Here we present FEM modeling results on isothermal as well as non-isothermal current sharing in Roebel and CORC cables containing broken elements of different size and intensity located in different places of the cables. CORC cables have an advantage of rather simple control of their stability via modifying the size of their cores. Conclusions on stability and quench of these cables in magnet windings are made.

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