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Conceptual Design and Optimisation of HTS Roebel Tapes

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To minimise the (alternate current) AC loss, multi-filament high-temperature superconducting (HTS) costed conductors (CCs) have been investigated for years. Many methods for striating the HTS CCs are developed and proven effective, such as laser cut and mechanical cut. This paper presents a novel approach to create the filamentary structure. Instead of cutting the HTS tape after manufacture, patterning process is introduced to the buffer layer before the deposition of the superconducting layer. Filamentary tapes with different patterns on the buffer layer are manufactured and measured. Experimental results show the AC loss is decreased by a factor of filament numbers, which indicates the patterning process is successful. This technology can not only produce filamentary HTS tapes conveniently and economically, but also provide the possibility of creating HTS tapes with multi striated superconducting layers with low AC loss.

Primary authors: HAO, Luning (University of Cambridge); YANG, Jiabin (University of Cambridge); Mr HU, Jintao (University of Cambridge); Ms TIAN, Mengyuan (University of Cambridge); WEI, Haigening (University of Cambridge); MA, Jun (Cambridge Universitry); SHEN, Boyang (University of Cambridge); COOMBS, Tim

Presenter: HAO, Luning (University of Cambridge)

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