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Wed-Mo-Po3.11-09 [95]: Experimental study on the quench characteristic of YBCO tapes with different arrangements

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Abstract: Because the current carrying capacity of a single superconducting tape is limited, in some practical superconducting devices, multiple tapes need to be used in parallel. Due to the inhomogeneity of the tape and their uneven current distribution, hot spots are easily formed on some of the tapes when the superconducting device passes through large current. The normal zone will not only spread in the tape containing local hot spots but also expand to other tapes parallel to them, eventually causing damage to the whole superconducting device. The research on the quench characteristics of stacking tapes and parallel tapes, which are two typical arrangements, has guiding significance for thermal stability evaluation and protection system design of superconducting devices. In this paper, Normal zone propagation velocity (NZPV) and minimum quench energy (MQE) of single-length tape, stacking double tapes and parallel double tapes were measured at the liquid nitrogen temperature. The quench propagation characteristics of parallel structure and single strip were compared. The experimental results show that NZPV of tape containing hot spots in parallel structure is slower than that of single strip due to the shunt effect.

Keywords: Quench propagation, YBCO tapes, Parallel structure, Normal zone propagation velocity, Minimum quench energy

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