

The AC Loss Analysis in the 5m HTS Power Cables

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Abstract — In the framework of the Russian R&D Program for superconducting power devices, the 30 m HTS power cable has been developed. Before the full-length cable production, as the first prototype the short 5 m cable model was produced and tested. After 30 m cable production the 5 m witness sample has been cut from the long piece and tested as well. To verify the calculations and designing principles both 5m cables were heavily instrumented by potential taps and sensors to measure current distribution among layers, voltage – current characteristics and other parameters. AC losses in these short cable pieces have been analyzed by use of digital measurements of current and voltages along the cable. The witness sample has been provided by thermocouples to evaluate AC losses by calorimetric method. The details of AC losses measurements are discussed. Their analysis and comparison with calculations by standard theoretical models are presented.

Index Terms — HTS power cables, AC losses, Bi-2223 tapes, Digital measurements.

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