

SELF-FIELD AC LOSSES IN Bi-2223 SUPERCONDUCTING TAPES

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The self-field AC loss in Bi-2223 silver sheathed tapes for AC currents of up to 100 A was measured at 77 K and frequencies of 60 Hz and 600 Hz using a lock-in amplifier. The frequency dependence indicated a purely hysteretic loss which can be well described in terms of the critical state model for a flat superconducting strip [1]. The only parameter needed to predict the self-field AC loss is the critical current of the critical state. Because the loss voltage is extremely small compared with the inductive voltage, a very high accuracy of the lock-in amplifier phase setting is required. Unlike in loss measurements on cylindrical superconducting samples, in the case of the tape the measuring circuit leads have to be brought out from the surface forming a loop where the changing magnetic field induces an additional voltage. Only if the loop formed by the leads at the voltage tabs is large enough will the apparent power dissipation approach the real AC loss associated with the length of the sample probed [2].

[1] W. T. Norris, J. Phys. D 3, 489 (1970).

[2] J. Clem, T. Pe and J. McDonald, (1995) to be published.