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HTS coated tapes in local magnetic field with gradients

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The behavior of short segments of YBCO coated conductors with double disordered (DD) nano structure were investigated in a 3 T magnetic field which was produced by a self-designed split-electromagnet at 77 K. The tapes investigated with this magnet were exposed to a non-homogeneously distributed field over a length of 10 cm with an imposed constant transport current of 0-10 A. The voltage response of the tape in this setup was measured during 0.3-3 s long magnet pulses. From additional I_c characterization of DD samples at 77 K and 0-6 T field, the field dependence of "core" parameters (n-, alpha-, etc. values) were studied in order to develop a model, which describes the voltage response in pulsed and geometrically limited fields. The voltage signal in the tape, described by the developed "extended alpha approximation" (EAA) takes into account the spatial field dependence of the magnetic field. We have shown that the integral voltage response of the dissipative currents in the field-exposed tapes can be described adequately with the EAA model. It is also shown that the field dependent critical current, defined by a standard 1 μ V/cm criterion, can be derived in this experimental setup by using the EAA approach.

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