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Assessment of high-performance superconducting wires at low temperatures

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In earlier study a 3 T pulsed electromagnet was the key tool in our experiments. Short pieces (of 20 cm length) of long tapes have been introduced in the magnet channel of the magnet and loaded with up to 10 A transport current. The voltage signal during the magnetic field pulse has been recorded and interpreted in terms of an “extended alpha approximation” approach. To develop this model, the commonly used n- and alpha-approximation, usually taken for critical current approximations at high fields, has been “extended” towards fields in the range of 0-6 T by determining n- and alpha-values of a number of samples at TU-Wien at 77 K and 0-6 T (B//c). Occurring gradients in the pulsed
field have been taken into account by integrating the voltage signal along the sample length x by using a function B(x) for the magnetic field.
Furthermore, the field distribution of a 2.54 T permanent magnet has been measured and sufficient stability of the magnetic field has been observed in the course of multiple temperature cycling performed between room temperature and the temperature of liquid nitrogen. The results of studies of both sources of magnetic field are used in the development of a tape characterization tool in which field gradients may appear.

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