**Non-destructive measurement of the magnetic moment of bulk GdBCO samples using a torque magnetometer designed for large size samples**

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The non-destructive determination of the volume magnetic properties of large bulk superconductors requires the development of measurement techniques applicable to large size samples. We report the design for a magnetic torque measurement system able to characterize the magnetic moment of ~1 cm3 samples at room and cryogenic temperature. This device can be used for torque magnetometry with an intermediate sensitivity between cryogenic torque magnetometers designed for millimetric-size samples and commercial torquemeters poorly adapted to extreme conditions. The torque sensing system is based on four piezoresistive strain gauges cemented on a cylindrical transmission shaft and mounted in a full Wheatstone bridge configuration. The absolute sensitivity of the device was calibrated using a small coil fed with DC current. The torque magnetometer was tested on several magnetic samples in order to measure their magnetic moment under crossed field conditions: a Nd-Fe-B permanent magnet and a GdBCO bulk superconductor. An excellent agreement was found with results obtained with a flux extraction magnetometer. The system can be used to determine the average *J*c of large samples and to study the demagnetization effects resulting from crossed magnetic fields. The torque magnetometer is able to measure magnetic moments ranging from 10-3 Am² (1 emu) up to a few Am². This extends significantly the accessible measurement range of “off-the shelf” magnetometers (e.g. SQUID, VSM) and could be scaled up to larger samples.

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