Contact-free Characterization of REBCO Coated Conductors by Vibrating Sample Magnetometer

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Introduction

Recent progress in REBCO coated conductors resulted in superior high critical currents achieving > 4 kA in typical, 4 mm wide flat conductors. That high current and its angular dependence are very difficult to measure at high magnetic fields due to space and cooling limitations. On the other hand their characterization is needed for both applications, as NHMFL 32 T magnet project as well as for understanding the physics of pinning and engineering of the commercial production process. To avoid problems with high currents we develop contact-less method based on vibrating sample magnetization measurement.

Experimental

The vibrating sample magnetometer was tested successfully in the 15 T superconducting magnet and in the 31 T resistive magnet. We got results comparable with these measured in lower fields in SQUID. Single 4 x 4 mm samples and stacks containing up to 100 samples were measured, the latter to better understanding magnetization dependence on magnetic field in real magnets.

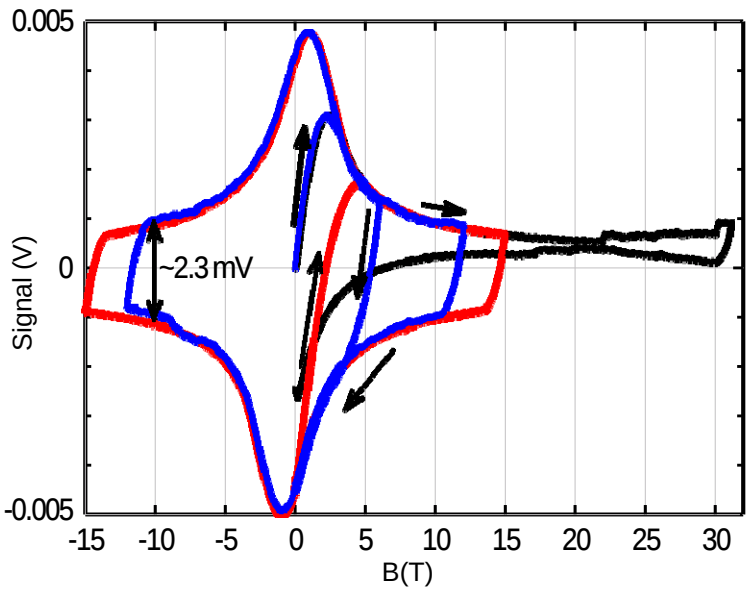

Figure 1 Signals proportional to magnetization measured in 4x4 mm sample of REBCO coated conductor as a function of magnetic field

Results and Discussion

The voltage response induced in our pickup coils can be seen in Figure 1. It is indicative of the hysteresis induced by a superconductor in a magnetic field. This response was observed at near liquid He temperatures and liquid N temperatures. A response indicative of a paramagnetic response was observed at room temperature.

Conclusions

Method and instrumentation were developed to study the magnetic properties of REBCO coated conductors. Coils were wound in house and a response indicative of a superconductor was observed. Results are still preliminary and the instrument still needs calibration and developments, especially for the highest field measurements.

Acknowledgements

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References

[1] Sinclair J.W. et al. APS March Meeting B36.012, Baltimore MD 2013