Vibrating Coil Magnetometer for REBCO Coated Conductor Characterization

Jaroszynski, J. (NHMFL); Constantinescu, A.M.; Hu, X.; Santos, M.

Introduction

Recent progress in REBCO coated conductors resulted in superior high critical currents achieving > 4 kA in typical, 4 mm wide conductors. That high supercurrent and its angular dependence are very difficult to measure at high magnetic fields due to space and cooling limitations. On the other hand REBCO conductor 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 (VSM) measurement.

Experimental

We successfully tested a new version of the device. We rebuilt the VSM to be a VCM (vibrating *coils* magnetometer). That makes it possible to rotate the sample *in situ*, better determine temperature and angle. Cryogenic piezoelectric actuator drives the device. The noise remains at a low level and measurements are possible in resistive magnet up to 31 T in cell 7.

Results and Discussion

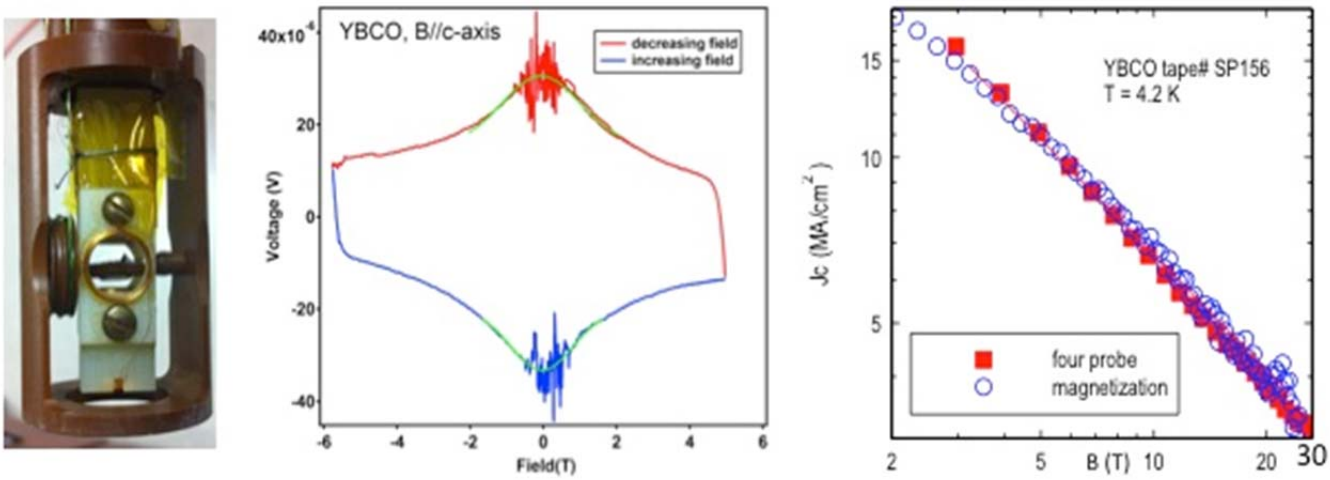

Figure 1 (a) Photograph of vibrating coils magnetometer. (b) Magnetization loop in YBCO conductor. (c) Comparison of critical current results obtained by magnetization and four probe measurements.

Conclusions

As Fig. 1 c shows, there is very good correspondence between results by means of magnetization and usual transport method. That proves the method as useful tool for REBCO conductor. It can be also used for other magnetization experiments.

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