Fundamental topics

Mawatari:

An interesting study of helical vortices in thin superconducting wires was presented. It is important to remark that the used for formalism was not the more common (in HTS Modelling) critical-sate approximation, but time dependented Ginzburg Landau approximation. The latter addresses superconducting problems taking into account phenomena occuring at the scale of penetration and coherence lenghts, which are neglected in critical state formalism. For this reason, we believe it is very interesting to incorporate this kind of approximations into the HTS Modelling mainstream.

Fundamental topics

Prigozhin:

In several scientific discussions in previous editions of HTS Modelling workshops, it was detected the need for developing a phenomenological model that can explain the hysteretic behaviour of soft ferromagnets at a large scale (larger than the domain walls width, for example). In this talk, it was presented a general framework to solve this gap, based on a carefully derived energy minimization scheme. Some examples fitting very well the experiments were shown. The presented model might eventually play a similar role as what the critical state model is doing for superconductors, which illustrates its impact and importance.

Fundamental topics

Gomory:

This contribution has focused on the relevant topic ofthe accurate analysis of AC losses in superconducting objects as pancake coils. Mainly the author establishes the comparison of what he calles a ‘microscopic’ derivation based on the integration of the local dissipation per unit volume e.j and the so-called ‘macorscopic’ method that evaluates losses in terms of the magnetic loops area. For the first case, the delicate issue of gauge selection for the correct evaluation of electric fields has been considered. Comparison of both methods to the experimental data have been used as a guide to select the proper resolution in space and time discretization of the problem.

Fundamental topics

Avila:

An interesting discussion on the appearance of d-line structures (discontinuity lines in the current density streamlines) for Nb thin films was presented. The main issue was to show that experiments do not exactly agree with the first approach analysis of this phenomenon in terms of a constant critical current density parameter. Especifically, the expected parabolic d-lines around a circular indentation are better understood in terms of a field dependent Jc, that was obtained for the sample by complimentary magnetic measurements.