WED 14-16 Quench Modelling

Yifeng Yang:

- Revisited Wilson's approach to MQE to develop it for HTS: dimensionless approach

Andy Gavrilin:

- Quench modelling of the NHFML 32 T ReBCO insert magnet
- Reality isn't always ideal: tape tilting within a winding (difficult to know the field angle directed to tapes), nonhomogeneous critical current distribution (which value to use in modelling)

Lorenzo Cavalluci

- Modelling for quench propagation velocity of Andy's magnet
- Excellent agreement with measurements

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Jeroen van Nugteren

First implementation of coupled thermal and magnetoquasistatic simulations for Roebel cables in manget size modelling domain in 3-D utilizing fast multipole method

Thin sheet approximation, but allowed current diffusion from tape to another via contact resistances

Justin Schwartz

Multiphysics model for large non-insulated REBCO multi-coils magnets with stability –enhanced mechanisms

Using resistance as a spatially varying design variable allows a creative a approach to the magnet design

Introduction of graded spatially resitastance for Ni magnets:
- Intracoil grading
- Single/multi barrier solutions

→ Reduction of the discharging time, prevention of the complete thermal cut-off, more uniform current density during transient

Conclusions (A. Stenvall)

Modelling requires benchmarking: reality is far from ideal

New methods are needed to enable computations of large problems

Quench modelling: picked up two topics for discussion (N. Amemiya)

“Quench characteristics of power superconductors and implications to modelling”

Generalized analyses rather than analyses for particular objects may be useful for general understanding of quench behaviors of HTS.

“Numerical analysis of the quench initialization transient in a ReBCO Roebel Cable”

Pros and cons of circuit model and FEM should be sorted out.