LTS quench session summary - I

(F. Bellina)

Target of quench analysis: set up an efficient diagnostic and protection system:

- Quench propagation velocity
- Heat load → final temperature evaluation
- Heaters and other devices (e.g. Cliq) efficiency and intervention times analysis

Analysis basic assumptions:

- Longitudinal → adiabatic conditions or He bath for NbTi
- Transverse → insulation must be considered, longer diffusion times

Problem characteristics:

- Different levels of detail: filament, strand, cable, magnet, up to entire circuit
- Strong material non linearities and need of material properties data (insulation, cabled Nb3Sn)
- Coupled problems with different characteristic times

LTS quench session summary - II

(F. Bellina)

Quench propagation models adopted:

- EM: Lumped network,
- TH: finite differences, FEM.
- Losses models:
- ✓ are network models applicable to IF and IS? → Better understanding of IF and IS currents paths
- ✓ Beam losses

He heat transfer coefficient (HTC) in CICCs

- HTC value not well known, different models with different predictions → He-strand and He-jacket HTCs measured from ITER CICC samples
- Analysis for different correlations
- Measurement approach:
- ✓ Heating from outside → evaluate possibility of using CuBe strand & heat from inside
- ✓ Equivalent model of porous medium and tests with sinusoidal input → use of models necessary: HTCs used as model parameters
- Not comprehensive and univocal results