MT25 Conference 2017 - Timetable, Abstracts, Orals and Posters



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## Stress-Strain Analysis in a 10 T non-Insulated GdBCO HTS Coil for the 25 T All-superconducting NMR Magnet

Wednesday 30 August 2017 13:15 (1h 45m)

A 25 T all-superconducting magnet, consisting of a 10 T GdBCO high temperature superconducting (HTS) insert and 15 T low temperature superconducting outer coils, is now in progress at Institute of Electrical Engineering, Chinese Academy of Sciences. Predicting the stress/strain distributions inside the HTS insert during its fabrication and energization accurately is one of the key issues to avoid the high field superconducting magnet's failure. In this paper, an improved finite element method was adopted to analyze the dynamic stress/strain distributions in the HTS insert, in which the effects of bending strain, pretension during winding, thermal contraction while cooling down, and the electro-magnetic force induced by the screening current and the transport current were taken into considerations. The thermal disturbance originating from the AC losses while its energization were also considered to analyze the stability of the HTS insert. To increase the simulation accuracy, the magnetic field dependency of critical current for each turn was incorporated into the calculations. And also, the related experiment was carried out to verify the simulation. The calculated results and experimental data were compared and discussed detailedly in the paper.

## **Submitters Country**

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