

CHATS on Applied Superconductivity 2015

Report of Contributions

Contribution ID: 14

Type: **not specified**

Modeling the KSTAR PF magnet system –an engineering work for the optimal operation

Monday 14 September 2015 14:15 (30 minutes)

Extending the development of a pilot of SUPERMAGNET model of the KSTAR PF magnet, the thermo-hydraulic analysis has been emerged as an essential part to study the performance of the superconducting magnet in KSTAR tokamak. Showing the possibility of a good simulator of superconducting tokamak, we develop a coupled CICC network of the full-scale central solenoids (PF1UL ~ PF7UL of KSTAR) in the framework of SUPERMAGNET code which enables orchestration of the individual solvers in CryoSoft 8.0 package. Into the model of the magnet system, autonomous heat load generation is included with validated two-tau model of coupling loss. It's a work for the physical simulator whose attempt is the reliable analysis when investigating the parametric model for real-time application. Hence, the feasibility and shortcoming is discussed as the performance issue of simulation comparing with the experimental data. The numerical stability, which is related to the 1-D flow connection to the volume node, is carefully investigated on the preliminary work to upgrade the cryo-network solver. For an attempt at a similar type of modification, we also present the applicability of user-defined component (compressor) and its connection scheme paying attention to the consistence of its dynamical behaviour.

Primary author: OH, Dong Keun (NFRI)

Co-author: OH, Sangjun (NFRI)

Presenter: OH, Dong Keun (NFRI)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 25

Type: **not specified**

Numerical Simulation of REBCO pancake coil with No-Insulation Technique

The No-Insulation (NI) technique has the prospect of high thermal stability and high current density. A REBCO pancake coil with NI technique has no insulation between turns, so that the current can flow directly to the adjacent turns escaping from a local hotspot or a local normal transition. It enhances the thermal stability. The high thermal stability of REBCO pancake coil with NI technique was confirmed in many experiments. The NI REBCO pancake coil did not burn out even though an extremely high current exceeding the critical current was applied. In addition, the absence of insulation increases the current density as well as the thermal stability. Indeed, the electrical phenomenon in the NI REBCO pancake coil is complicated, and the stability is affected by the coil specifications, such as the contact resistivity, the coil size, the number of turns, and so on. However, it is hard to experimentally investigate the electromagnetic and thermal behavior of various NI REBCO pancake coils.

For clarifying the electrical and thermal behavior of NI REBCO pancake coils, we have developed the partial element equivalent circuit (PEEC) model as an electric circuit simulation method. It is combined with the finite element thermal analysis. The simulation results agree with the measurements well. The mechanism of the high stability is clarified through the simulation of the overcurrent test and the sudden discharge test. We will show the simulation method and the comparison between the simulation and measurement results.

This research was partially supported by the Ministry of Economy, Trade and Industry of the Japanese Government, and Grant-in-Aid for Scientific Research(C), the Ministry of Education, Science, Sports and Culture (No. 25350558).

Primary author: Prof. NOGUCHI, So (Hokkaido University)

Co-authors: Ms IKEDA, Aika (Waseda University); Prof. ISHIYAMA, Atsushi (Waseda University); Dr UEDA, Hiroshi (Osaka University); Mr MONMA, Katsutoshi (Hokkaido University); Mr OKI, Takahiro (Waseda University); Mr WANG, Tao (Waseda University)

Presenter: Prof. NOGUCHI, So (Hokkaido University)

Contribution ID: 41

Type: **not specified**

Opening welcome

Monday 14 September 2015 09:00 (15 minutes)

Presenter: BRESCHI, Marco (University of Bologna, Italy)

Contribution ID: 42

Type: **not specified**

Thermal modelling of the HiLumi Nb₃Sn MQXF inner triplet magnets with OpenFOAM – Development of superfluid helium code

Monday 14 September 2015 09:15 (30 minutes)

Presenter: VAN WEELDEREN, Rob (CERN)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 43

Type: **not specified**

Modelling of transient dynamics leading to crisis in a boiling helium natural circulation loop

Monday 14 September 2015 09:45 (30 minutes)

Presenter: FURCI, Hernan (CEA Saclay)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 44

Type: **not specified**

Dynamic simulations of a tokamak cryogenic system

Monday 14 September 2015 10:15 (30 minutes)

Presenter: CIRILLO, ROBERTA (CEA)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 45

Type: **not specified**

A Physics-Based Simplified Model for the ITER Cooling Loops

Monday 14 September 2015 11:00 (30 minutes)

Presenter: BOTTURA, Luca (CERN)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 46

Type: **not specified**

Process Control Strategy for ITER Central Solenoid Operation

Monday 14 September 2015 11:30 (30 minutes)

Presenter: MAEKAWA, Ryuji (ITER Organization)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 47

Type: **not specified**

Characterization of the thermal coupling between the ITER TF coil conductor and the structure cooling circuit

Monday 14 September 2015 12:00 (30 minutes)

Presenter: FLORENT, Gauthier (ITER)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 48

Type: **not specified**

ITER Side Correction Coil Quench Model and Analysis

Monday 14 September 2015 12:30 (30 minutes)

Presenter: NICOLLET, Sylvie (CEA)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 50

Type: **not specified**

Thermo-hydraulic analyses associated to a design proposal for DEMO TF conductor

Monday 14 September 2015 14:45 (30 minutes)

Presenter: VALLCORBA, Roser (CEA - Saclay)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 51

Type: **not specified**

Predictive 1-D analysis of the prototype HTS current leads for the ITER Correction Coils

Monday 14 September 2015 15:15 (30 minutes)

Presenter: HELLER, Reinhard (Karlsruhe Institute of Technology)

Session Classification: Session I: Thermo-hydraulics and cryogenics

Contribution ID: 52

Type: **not specified**

Quench Analysis of the 11 T Nb₃Sn Dipole for the LHC Luminosity Upgrade

Monday 14 September 2015 16:00 (30 minutes)

Presenter: IZQUIERDO BERMUDEZ, Susana (CERN)

Session Classification: Session III: LTS quench

Contribution ID: 53

Type: **not specified**

Lumped-Element Dynamic Electro-Thermal model of a superconducting magnet

Monday 14 September 2015 16:30 (30 minutes)

Presenter: MACIEJEWSKI, Michal (Technical University of Lodz(PL))

Session Classification: Session III: LTS quench

Contribution ID: 54

Type: **not specified**

Analysis of the quench propagation along Nb₃Sn Rutherford cables with the THELMA code

Monday 14 September 2015 17:00 (30 minutes)

Presenter: BELLINA, Fabrizio (Udine University)

Session Classification: Session III: LTS quench

Contribution ID: 55

Type: **not specified**

Stability modeling of the LHC Rutherford cables subjected to beam losses

Tuesday 15 September 2015 08:30 (30 minutes)

Presenter: BRESCHI, Marco (Universita e INFN, Bologna (IT))

Session Classification: Session III: LTS quench

Contribution ID: 56

Type: **not specified**

Using the HELIOS facility for assessment of bundle-jacket thermal coupling in a CICC

Tuesday 15 September 2015 09:00 (30 minutes)

Presenter: LACROIX, Benoit (CEA)

Session Classification: Session III: LTS quench

Contribution ID: 58

Type: **not specified**

Numerical analysis of propagation of thermal disturbances in REBCO tapes

Tuesday 15 September 2015 09:30 (30 minutes)

Presenter: BRIGHENTI, Alberto (Polytechnics of Torino)

Session Classification: Session III: HTS quench

Contribution ID: **60**

Type: **not specified**

Electro-thermal Analysis of quench in High Field HTS coils

Tuesday 15 September 2015 10:45 (30 minutes)

Presenter: CAVALLUCCI, Lorenzo (University of Bologna)

Session Classification: Session III: HTS quench

Contribution ID: **61**

Type: **not specified**

Comprehensive quench analysis of the NHMFL 32T all-superconducting magnet

Tuesday 15 September 2015 11:15 (30 minutes)

Presenter: GAVRILIN, Andrey (Florida State University, Florida, USA)

Session Classification: Session III: HTS quench

Contribution ID: 62

Type: **not specified**

Open-source software to model High Temperature Superconductor

Tuesday 15 September 2015 11:45 (30 minutes)

Presenter: TRILLAUD, Frederic (Universidad Nacional Autónoma de México)

Session Classification: Session IV: HTS Electromagnetics

Contribution ID: 63

Type: **not specified**

Modeling AC ripples in HTS coated conductors by integral equations

Tuesday 15 September 2015 12:15 (30 minutes)

Presenter: GRILLI, Francesco (Karlsruhe Institute of Technology)

Session Classification: Session IV: HTS Electromagnetics

Contribution ID: 64

Type: **not specified**

Ac Loss Calculation of a Dipole Magnet Wound with Coated Conductors

Tuesday 15 September 2015 14:00 (30 minutes)

Presenter: AMEMIYA, Naoyuki (Kyoto University)

Session Classification: Session IV: HTS Electromagnetics

Contribution ID: 65

Type: **not specified**

Test of a prototype large current HTS cable for fusion

Tuesday 15 September 2015 14:30 (30 minutes)

Presenter: BRUZZONE, Pierluigi (EPFL-CRPP)

Session Classification: Session IV: HTS Electromagnetics

Contribution ID: 66

Type: **not specified**

Simulation of current distribution in twisted 2G tapes in terms of the H formulation taking in account the stress induced by torsion

Tuesday 15 September 2015 15:00 (30 minutes)

Presenter: SOTELO, Guilherme (Fluminense Federal University)

Session Classification: Session IV: HTS Electromagnetics

Contribution ID: 68

Type: **not specified**

Numerical Simulation on Magnetic Field generated by Screening Current in REBCO coils

Tuesday 15 September 2015 15:45 (30 minutes)

Presenter: UEDA, Hiroshi (Osaka University)

Session Classification: Session IV: HTS Electromagnetics

Contribution ID: 69

Type: **not specified**

Modeling and testing of transverse, axial and torsional strain on REBCO tapes

Tuesday 15 September 2015 16:20 (30 minutes)

Presenter: NIJHUIS, Arend (University of Twente)

Session Classification: Session V: Design methods and mechanics

Contribution ID: 71

Type: **not specified**

Invited presentation: The simulator of FERRARI formula 1 vehicle

Wednesday 16 September 2015 09:00 (1 hour)

Presenter: TORTORA, Giacomo (Ferrari Sport Team)

Contribution ID: 72

Type: **not specified**

Study on magnetic field deviation due to manufacturing errors of the SIS100 superconducting magnets

Wednesday 16 September 2015 10:00 (30 minutes)

Presenter: SUGITA, Kei (GSI)

Session Classification: Session V: Design methods and mechanics

Contribution ID: 79

Type: **not specified**

Design and Optimization of a HTS Insert for Solenoid Magnets

Wednesday 16 September 2015 10:30 (30 minutes)

Presenter: TOMASSETTI, Giordano (ENEA)

Session Classification: Session V: Design methods and mechanics

Contribution ID: **80**

Type: **not specified**

Simulation of the Cabling Process for Rutherford Cables: an Advanced FEM Model

Wednesday 16 September 2015 11:20 (35 minutes)

Presenter: CABANES ARACIL, Jaime (CERN)

Session Classification: Session V: Design methods and mechanics

Contribution ID: **81**

Type: **not specified**

Structural Modeling of HTS Tapes and Cables

Wednesday 16 September 2015 11:55 (30 minutes)

Presenter: ALLEN, Nathaniel (Tufts University)

Session Classification: Session V: Design methods and mechanics