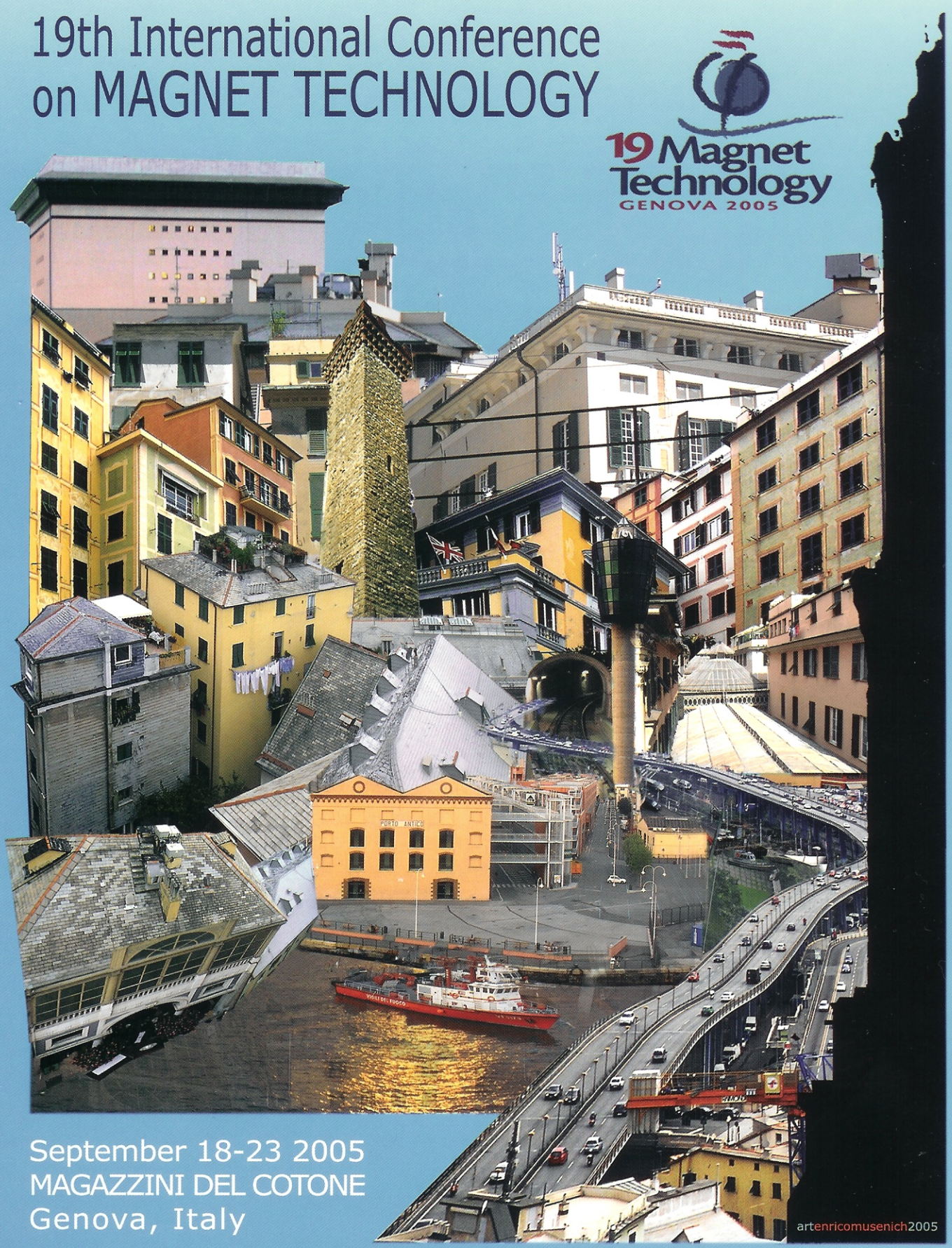
19th International Conference on MAGNET TECHNOLOGY

19 Magnet Technology
GENOVA 2005



September 18-23 2005
MAGAZZINI DEL COTONE
Genova, Italy

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motor performance in design process. In the first step of motor design, the map is draw; Motor characteristics such as output power, efficiency, power factor, and current density will be mapped in EMF-inductance coordinates. According to limit or required performances, the map has contour lines. During designing a motor, the inductance and EMF will be shown as a point in the map. With the transition of the point, the design direction will be decided easily. This all process will be shown in 1MW superconducting motor design.

WEA04PO07
Optimal Design of Superconducting Motor to Improve Power density using Experimental Design and Response Surface Methodology
J-Y. Lee, S-I. Kim, J-P. Hong, Changwon Naitonal University; S-K. Baik, M-H. Sohn, Y-K. Kwon, KERI.
This paper proposes an effective design process for 1MW HTS superconducting motor with experimental design (design of experiment; DOE) and Response surface methodology (RSM). DOE is used as the first step of optimization method, and in here main design parameters are decided. Between contradicted design variables, a small number which can improve power density is selected for optimal design. With the selected variables, RSM is used for the motor optimal design to improve power density. The utility of this method is verified through the comparison of the performances of the optimal geometry and those of the initial geometry.

POSTER SESSION 13:30 – 15:30
STABILITY

WEA05PO01
Finite allowable temperature rise of high temperature superconducting composites before thermal runaway and its influence on stable states
V.R. Romanovskii, RRC Kurchatov Institute; K. Watanabe, G. Nishijima, S. Awaji, High Field Laboratory for Superconducting Materials, IMR.
Withdrawn.

WEA05PO02
Temperature-dependent electromagnetic behavior of high-Tc superconducting current-carrying elements
Withdrawn.

WEA05PO03
Experimental Investigation of the Stability of Cu/NbTi Multifilament Composite Wires
F. Trillaud, CEA-Saclay; A. Devred, CEA-Saclay, CERN; F. Ajela, P. Tixador, CRTBT/CNRS.
The stability of Cu/NbTi multifilament composite wires remains an important data for magnet design. It has been characterized in helium bath cooling conditions. A new heating method based on fibered diode laser technology was developed to trigger localized heat disturbances of short durations. To compensate for the poor optical absorption of the copper stabilizer of composite wires, the wire surface was blackened by chemical oxidation. To back-up the measurements, various attempts at calibrating the energy delivered by the diode laser have been carried out and a study of the influence of the cryogenic environment on the optical fiber coupled to the diode laser has also been conducted. This new experimental technique led to a significant improvement in measurement reproducibility, yielding accurate estimates of Minimum Quench Energies (MQE) and Normal Zone Propagation Velocities (NPZ). In addition, the recorded data give deep insights on the early developments of the normal zone and help us understanding the mechanisms that are involved.

WEA05PO04
Detailed 3D ANSYS Quench Simulation of Superconducting Strands, Cables and Magnets with possible Quench causing Effects.
R. Yamada, FNAL; M. Wake, KEK.
The quench starting phenomena in strands are simulated in details in 3-D and in time using ANSYS and other FEM programs. The current sharing between the superconductor and copper stabilizer in strands at the beginning of a quench is clearly simulated and displayed in time sequence. This initial quench behavior is used to calculate the minimum quench energy, MQE, and minimum propagation zone, MPZ. They are calculated with different parameters of Jc, RRR, flux jump energy and others, for different kinds of Nb3Sn and Nb3Al strands. These calculated values are compared with experimental values. From these parameters, the stability for each strand is studied. Based upon the stability of the strand, the stability of the Rutherford cables is studied. The stability of magnets made of these cables is simulated for their quench behavior. For magnets the quench behaviors at the splice region and at high field regions are discussed with the stability of strands and with the supercurrent effects with different magnets.

WEA05PO05
Over-current pulse characteristics of YBCO Tapes
A. Ishiyama, Y. Ushiku, H. Naka, H. Ueda, Institute for Materials Research, Tohoku University; Y. Shiohara, ISTEC-SRL.
Coated conductors are expected to be used in future high-temperature superconductor applications, because it has better Jc characteristics in high temperatures and in high applied magnetic fields. For application to electric power devices, such as transmission cables, transformers, fault current limiters, the superconductors are subjected to short-circuit fault currents. In this study, the characteristics of the transition to the normal state and normal-zone propagation in YBCO sample tapes were examined experimentally and numerically subjected to over-current pulse. The YBCO sample tapes (20-cm long and 1-cm wide) were produced by IBAD/PLD and MOD/TFA methods. Measurements were performed as a function of the amplitude of an over-current pulse for operating temperatures of 55K, 60K, and 65K (Gifford-McMahon cryocooler was adopted) in a background magnetic field of 5T. The experimental results were compared with simulations using a developed computer program based on the finite element method (FEM). In the computer program, the I-V characteristics of the YBCO sample tapes were taken into account. The results of the simulations were in good agreement with the experiments. The influence of the thickness of Ag-stabilizer on the peak temperature and transient thermal behavior of YBCO tapes was also evaluated experimentally and numerically.

WEA05PO06
Relation between mechanical losses and winding tensions at cryogenic temperature in AC superconducting coils
N. Sekine, Yokohama National University, S. Tada, T. Higuchi, Y. Furumura, T. Takao, A. Yamanaka, Sophia University.
Withdrawn.