

## Quench Analysis of High Field REBCO Coils

W. D. Markiewicz<sup>1</sup>, J. Jaroszynski<sup>1</sup>, A. Xu<sup>1</sup>, D. Abraimov<sup>1</sup>, H. Bai<sup>1</sup>,  
H. Hartley<sup>1</sup>, and M.S. Walker<sup>2</sup>

<sup>1</sup>National High Magnetic Field Laboratory, Florida State University

<sup>2</sup>Intermagnetics General Corporation, retired

**Abstract** - High field superconducting magnets in the range of 30 - 40 T are under development employing REBCO inner coils in a background field magnet. Protection methods familiar from Low Temperature Superconductor magnets are expected to be less efficient in REBCO coils. There is also motivation to limit the amount of stabilizer copper in these coils. There is need for detailed quench analysis of REBCO coils to design suitable protection systems. A new electrical, magnetic and thermal analysis code has been prepared that combines field calculation, coil circuit analysis and thermal diffusion analysis in coils. The code contains conductor critical properties recently measured, including critical current and field orientation dependence as a function of temperature. The quench analysis of representative high field coils that contain conventional turn insulation is presented. Conditions leading up to quench are examined for temperature distribution and voltage growth. The distribution of temperature throughout the windings is followed in time, along with that of the critical current, the dissipation power and resistive voltage. Various quench conditions are studied, including unprotected quench and the effect of protection heaters.

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