

Opportunities and Challenges of No-insulation Winding Technique for Stability Enhancement of Low Temperature Superconductor Magnet

Jeseok Bang¹, Kibum Choi¹, Soobin An¹, Jaemin Kim¹, Seungyong Hahn¹

Seoul National University, Seoul, Korea¹

The no-insulation (NI) winding technique for low temperature superconductor (LTS) magnet was proposed a few decades ago. In early days, mainly due to the low stability margin of LTS, the NI technique was regarded to be unacceptable to LTS magnets. Recently, multiple variations of the NI technique such as partial-insulation, metal-clad insulation, metal-co-wound and electrically-conductive epoxy resin were proposed, which led to an expectation to use those innovative winding methods to substantially improve stability margin of LTS magnets. This paper presents an analytic study on applying the NI (or its variations) technique to various LTS magnets. Stability margin and minimum quench energies are compared in various types of LTS coils with and without the *insulation*. Discussions on new opportunities and potential pitfalls are also provided in details.

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