Numerical Simulation of NbTi Superconducting Joint with Cold-Pressing Welding Technology

Feng Zhou, Junsheng Cheng, Jianhua Liu, Yinming Dai,
Qiuliang Wang, Namin Xiao, Luguang Yan

Institute of Electrical Engineering,
Chinese Academy of Sciences, Beijing, 100190, China

E-mail: zhoufeng@mail.iee.ac.cn

Abstract - pressing welding methods are employed to fabricate joints between NbTi multi-filamentary conductors, and a series of joints are made at the different press amounts for NMR magnet applications. The Abaqus-Explicit method was used to do a quasi-static analysis of the cold-pressing welding process. In the simulation, we consider the contact area and equivalent plastic strain to determine the resistance of the superconducting joints, qualitatively. The simulation shows that a press amount of 61%-65.5% should be the optimum range, in which, the lowest joint resistance can be obtained. Resistances of these joints are also tested using the current decay method to verify the simulation.

Keywords - NbTi superconducting joint; cold-pressing welding; resistance; Abaqus-Explicit methods.

Submitted September 30, 2013, accepted October 12, 2013. Reference No. ST347; Category 5.
Final version of this paper was published in IEEE Trans. Appl. Supercond. 23, 4802706 (2013); DOI: 10.1109/TASC.2013.2277779