

Experimental Studies of Transverse Stress Effects on the Critical Current of Sub-sized Niobium-tin Superconducting Cables

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Abstract - A simple and reliable test method for transverse load experiments of sub-sized cables has been developed in order to study mechanical and electrical transverse load effects on superconducting cables. The device uses straight samples in a hairpin configuration. Three different size cables of a single strand, a triplet and a 45-strand cable were systematically tested. The hairpin sample device was successfully operated and provided very reliable experimental data. The unique experimental design allows great flexibility, and different size cables can be efficiently tested with minor parts changes to the sample holder. One sample can be mounted and tested in a week's time frame using a superconducting split magnet available at National High Magnetic Field Laboratory (NHMFL), Florida State University (FSU). In this paper the characteristics of the device and the measurement technique are described. The test results from the three different cables are reported and discussed.

Keywords - Fusion, ITER, Cable-in-Conduit Conductors (CICC), critical current, transverse stress, Nb₃Sn, superconducting cable.

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