Contribution ID: **78** Type: **Poster Presentation of 1h45m**

Mechanical properties of aged 316LN butt-welding joint at cryogenic temperature for CFETR CS model coil

Wednesday 30 August 2017 13:15 (1h 45m)

Institute of Plasma Physics Chinese Academy of Science (ASIPP) is designing and manufacturing a Central Solenoid Mode Coil (CSMC) to develop the manufacturing process for China Fusion Engineering Test Reactor (CFETR) CS coil. The hybrid magnet structure is employed for the CSMC, and modified 316LN stainless steel is selected as the jacket material for the Nb3Sn cable in conduit conductor, which will be connected by butt-welding to reach the required maximum length of about 780 m. Automatic welding and manual welding methods are used for the circular and corner parts of the round in square tubes respectively. The purpose of this paper is to qualify the 316LN welding joint performance. Tensile properties, fracture toughness and fatigue crack growth rates of the aged 316LN butt-welded joint at liquid helium temperature were evaluated and reported.

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Session Classification: Wed-Af-Po3.10

Track Classification: F8 - Structural Materials for Magnets