Contribution ID: **149** Contribution code: **THU-OR5-601-07** Type: **Oral**

Measurements of AC loss evolution in ITER TF Conductors

Thursday 18 November 2021 20:00 (15 minutes)

AC loss in the Nb3Sn cable-in-conduit conductors (CICC) usually decreases after the conductor undergoes electromagnetic cycling. This can be attributed to the increase of inter-strand resistance due to strand-bonding detachment during cyclic loading. In the years 2018 to 2020, ITER launched a series of test campaigns in SULTAN test facility, whose aim was to study the Tcs degradation of TF conductors of all manufactures. Along the main scope of the project, an accompanying study of the AC loss evolution has been measured on two samples. The AC loss was measured prior any electromagnetic loading, after 1, 5, 50 and 1000 cycles, and at the very end also after a thermal cycle to room temperature. Sinusoidal AC loss was measured in the frequency range of 0.1 to 1.0 Hz. The measured AC evolution will help to predict heat load generated in the TF coils during the initial phase of ITER operation. It may also serve as an input to analysts for deducing the evolution of inter-strand resistance during electromagnetic cycling.

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Session Classification: THU-OR5-601 A15-type Superconducting Wires and Cables