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## **ANALYSIS OF EARLY QUENCH DEVELOPMENT IN JT-60SA TOROIDAL FIELD COILS TESTED IN THE COLD TEST FACILITY**

*Tuesday, August 29, 2017 1:15 PM (1h 45m)*

The Toroidal Field system of the JT-60SA tokamak is composed of 18 NbTi superconducting coils. Half of them are provided by France within the Broader Approach Agreement. These coils are manufactured by General Electric (ex-Alstom) at Belfort, France. Each TF coil is composed of 6 cable-in-conduit conductor lengths, wound in double-pancakes, carrying a nominal current of 25.7 kA. These coils are being tested in the single coil configuration at the so-called Cold Test Facility (CEA/IRFU Saclay, France). The test program includes for all coils a DC operation for one hour at nominal temperature (4.7 K) and nominal current followed by a progressive operating temperature increase at nominal current up to quench (around 7.5 K inlet temperature). Thanks to the accuracy of the fast Data Acquisition System at 10 kHz sampling rate which is triggered by the quench, but which allows the measurement of the six double-pancake voltage drops up to 10 s before the magnet fast discharge, it has been possible to follow the very early development of the quench at the scale of a few millimeters normal (i.e. non-superconducting) length. In addition, this early quench development over one conductor length was also simulated using the THEA code with relevant boundary conditions. The paper will report on the analyses of two different quenches which occurred on two different coils: one starting on the central pancake winding which corresponds to the peak magnetic field, the other starting on a side pancake corresponding to a more heated conductor due to heat transfer from the casing. Early quench development and propagation play a major role in quench detection.

### **Submitters Country**

France

**Primary author:** CIAZYNSKI, Daniel (CEA)

**Co-authors:** MOLINIE, Frederic (DAPNIA); Mr GENINI, Laurent (CEA/IRFU); NICOLLET, Sylvie (CEA); Dr ABDEL MAKSOUD, Walid (CEA/IRFU); HUANG, Yawei (CEA Saclay)

**Presenter:** CIAZYNSKI, Daniel (CEA)

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