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Quench Tests Analyses of the First JT-60SA Toroidal Field Coils

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JT-60SA is a fusion experiment which is jointly constructed by Japan and Europe, and which shall contribute to the early realization of fusion energy by providing support to the operation of ITER and by addressing key physics issues for ITER and DEMO. The JT-60SA is based on the existing infrastructure of JT-60U experiment and is upgraded by using **superconducting coils**. JT-60SA tokamak consists of 18 **Toroidal Field (TF)** superconducting coils which will be provided by European industry and tested in a **Cold Test Facility (CTF)** at CEA Saclay.

In order to check the performance of the JT-60SA TF coils and hence mitigate their possible fabrication risks, the coils have been cooled in the CTF with supercritical helium at **5 K** and have been supplied at the nominal current of **25.7 kA**. One major test performed is the so-called “**quench test**”, or “**temperature margin test**”, during which the inlet helium temperature of the **Winding Pack (WP)** is controlled to increase progressively up to quench followed by a fast discharge of current during about **60 s**. The measurements of voltage, pressure and temperature allow me to study the **quench propagation** in the coil and the corresponding physical phenomena. **Four quench dynamic phases** will be identified during the analyses of the coils behavior.

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