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## THELMA Analyses of ITER NbTi Cable-in-Conduit Conductors

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The THELMA code, developed for the analysis of coupled electromagnetic and thermal-hydraulic transients in superconducting Cable-in-Conduit Conductors (CICC) [1, 2], has been recently applied to the analysis of one of the two legs of the Poloidal Field Conductor Insert Full Size Joint Sample (PFCI-FSJS), a NbTi CICC short sample tested in the SULTAN facility. THELMA was able to reproduce the premature and sudden nature of the cable resistive transition at high transport current, due to the combined effect of current, field and temperature non-uniformities on the CICC cross section, together with the presence of voltage spikes precursors of the transition, caused by fast current redistribution [3].

The same computational tool is now applied to a more general study of the influence that different parameters have on the NbTi normal transition, namely: 1) the amplitude of the transport current, 2) the presence or absence of sub-cable wrappings, 3) the length of the high-field region and its distance from the joint, 4) the type of joint.

The above issues have been addressed over the years in different experiments, including the PFCI-FSJS, the PFCI [4], and the hairpin samples tested more recently in SULTAN [5]. These experiments provide the database against which the THELMA results will be compared.

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[5] B. Liu, Y. Wu, F. Long, and S. Li, "Test results and analyses of conductor short samples for China first PF conductor", *Cryogenics*, vol. 51, pp. 90–94, Feb. 2011.

**Author:** Prof. BELLINA, Fabrizio (Udine University, Dipartimento di Ingegneria Ingegneria Elettrica, Gestionale e Meccanica)

**Co-authors:** Dr SAVOLDI RICHARD, Laura (Politecnico di Torino, Dipartimento di Energetica); Prof. RIBANI, Pier Luigi (Bologna University, Dipartimento di Ingegneria Elettrica); Prof. ZANINO, Roberto (Politecnico di Torino, Dipartimento di Energetica)

**Presenter:** Prof. BELLINA, Fabrizio (Udine University, Dipartimento di Ingegneria Ingegneria Elettrica, Gestionale e Meccanica)

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