



Contribution ID: 279

Type: **Poster**

Wed-Af-Po.11-01: Development of a thermal-hydraulic simulation module for cable stability analysis

Wednesday 2 July 2025 14:30 (2 hours)

In this paper, we develop a new thermal-hydraulic simulation module as part of the Tokamak magnet software under development. The module focuses on the coupling effect between thermo-hydraulics and electromagnetism to study the LTS/HTS cable-in-conduit-conductor (CICC) stability margin and quench characteristics. The algorithm of the program is based on the finite element method. We present the structure of the module, emphasizing the various codes and the methodologies employed for their integration. Then, the application of the module is evaluated, showing good consistency with physical expectations and other developed codes. Based on this module, we provide parameter analysis capabilities in CICC cable design, and this module will serve as a key part of our future software development.

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Session Classification: Wed-Af-Po.11 - Modelling of Fusion Conductors and Coils I