Contribution ID: **37** Type: **not specified**

Electro-mechanical modeling of the fusion cables

Monday, 20 September 2021 13:15 (25 minutes)

Until today several designs of the Nb3Sn Cable-In-Conduit Conductors (CICCs) have been developed for different high-performance tokamak magnets. The Nb3Sn strands composing the conductors are submitted to mechanical stresses of electromagnetic (EM) and thermal origin, inducing local deformations and affecting the strands critical current carrying capability. Even though it is possible to test the conductors to evaluate the electrical performance, it is still not possible to predict them during the conceiving phase.
The main goal of this work is to present a numerical tool able to predict the electrical performance of the conductor in operation, based on the finite element (FE) code simulations MULTIFIL. The code was adapted in the past to simulate the mechanical behavior of the fusion conductors subjected to several loadings. However in the last three years the code and the numerical approach have been largely upgraded to consider a more realistic model and simulation of the conductor. The mechanical results of code MULTIFIL are coupled with analytical and numerical electroamgnetic tools to compare the simulated electrical performance with the experimentally measured ones. More over several studies have been performed to investigate the influance of the design parameters such as the void fraction, the twist pitches and the conductor shape, on the electrical perfomance of the conductor.

Category

Mechanical modelling of LTS and HTS magnets

Keywords

Primary author: Mrs RICCIOLI, Rebecca (CEA - Commissariat à l'énergie atomique et aux énergies alternatives)

Co-authors: BRESCHI, Marco (University of Bologna); TORRE, Alexandre (CEA - Commissariat à l'énergie atomique et aux énergies alternatives); Dr DURVILLE, Damien (ECP - Ecole Centrale Paris); Dr LEBON, Frederic (LMA - Laboratory of Mechanics and Acoustic)

Session Classification: Mechanical modelling of LTS and HTS magnets