



Contribution ID: 163 Contribution code: FRI-OR7-303-06

Type: Oral

Development of HTS conductor for the central solenoid of compact fusion reactor TRT

Friday 19 November 2021 11:15 (15 minutes)

The article presents the results of the preliminary development of the HTS conductor based on the VS-type design for the central solenoid of the compact thermonuclear reactor TRT, which is under development in Russia. The operating current of the conductor have to be at least 60.0 kA in the field of 15 T at temperatures of 5-20 K. The compactness of the magnetic system requires the creation of a conductor with a high engineering current density, reaching of 90 A / mm². In the central solenoid, the wire is subjected to significant mechanical loads caused by the Lorentz forces. In addition, the significant stored energy in the magnet requires the presence of elements in the conductor that provide an emergency energy output at an acceptable voltage and heating of the winding, which does not lead to damage to its elements. Two constructive versions of the VS type conductor based on radially arranged HTS tapes are considered. At the same time, the required amounts of stabilizing and reinforcing materials are included in the conductor design. The analysis of the proposed conductors calculated characteristics under various operating modes of the electromagnetic system of the TRT tokamak is carried out. The results of calculations by the finite element method of the distribution of the magnetic field in the conductor, its current carrying capacity and the assessment of energy losses in a changing magnetic field are also presented.

Authors: SYTNIKOV, Victor (R&D Center @ Federal Grid Company); Dr LELECHOV, Sergey (ITER Design Center); Dr ZUBKO, Vasily (R&D Center of FGC UES)

Presenter: SYTNIKOV, Victor (R&D Center @ Federal Grid Company)

Session Classification: FRI-OR7-303 HTS coil II