Contribution ID: **260** Type: **Poster**

Thermal-hydraulic analysis of high temperature superconducting magnets in CFETR

Tuesday 6 June 2017 13:40 (2 hours)

The China Fusion Engineering Test Reactor (CFETR) is the next device in the roadmap for the realization of fusion energy in China, which aims to bridge the gaps between the fusion experimental reactor ITER and the demonstration reactor (DEMO). CFETR will be operated in two phases: Steady-state operation and self-sufficiency will be the two key issues for Phase I with a modest fusion power of up to 200 MW. Phase II aims for DEMO validation with a fusion power over 1 GW.[1]
For saving the cost of construction and meeting both Phase I and Phase II targets with achievable technical solutions, a new design has been made by choosing a larger machine with R =6.6m,/a=1.8m, BT= 6-7T. Over 1GW fusion power can be achieved technically and it is easy to transfer from Phase I to Phase II with the same machine. In order to obtain the maximum magnetic flux of 224 VS from the CS coils in Phase II, the high temperature superconductors of Bi2212 material are used for the CFETR reactor.[2]
In order to evaluate the feasibility of high temperature superconducting magnets used in CFETR, the 4C code is employed in this paper to analyze the thermal-hydraulic state of the coils.
The inlet and outlet pressure of helium cooling loops and operational temperature of the magnets is designed. The temperature margin of the superconducting magnets for the reference scenario of plasma discharge is estimated.

[1] Yuanxi Wan, Jiangang Li et al , Overview of the present progress and activities on the Chinese Fusion Engineering Test Reactor, submitted to Nuclear Fusion.
[2] Zheng J.X. et al 2016 IEEE Trans. Appl. Supercond. 26(7) 4205505

Eligible for student paper award?

No

Author: Dr LI, Junjun (Institute of Plasma Physics Chinese Academy of Sciences)

Co-authors: ZAPPATORE, Andrea; SAVOLDI, Laura (Politecnico di Torino); ZANINO, Roberto (Politecnico di Torino); GAO, Xiang (Institute of Plasma Physics, Chinese Academy of Sciences); LIU, XiaoGang (ASIPP); REN, Yong (Hefei Institutes of Physical Science, Chinese Academy of Scienc); WANG, Zhaoliang

Presenter: Dr LI, Junjun (Institute of Plasma Physics Chinese Academy of Sciences)

Session Classification: T.POS: Poster Session T

Track Classification: Magnets