Contribution ID: **185** Type: **Oral**

Progress and Study on the Superconducting Magnet System of China Fusion Engineering Test Reactor

Wednesday 7 June 2017 17:20 (20 minutes)

CFETR (China Fusion Engineering Test Reactor) concept design work was started in 2012. It is developed in two stage. CFETR-Phase I is designed with major radius R=5.7m, minor radius a=1.6m and magnetic field at plasma region BT=4-5T. 16 toroidal field coils and 6 central solenoid coils were designed using Nb3Sn CICC conductor with maximum operation current of 64 kA and 50 kA, respectively. Three types of plasma equilibrium shapes are designed, namely ITER-like single null, super-X and snowflake. The maximum flux provided by central solenoid is designed as 180 volt-second. However, in order to study high-performance issues such as steady-state particle and heat exhaust, disruption mitigation and avoidance, ELM control, and material damage by high heat flux and neutron, the superconducting magnet system of CFETR-phase II has been updated based on a larger machine with R = 6.7m, a=2.0m, and BT= 6-7T. With this new design, over 1GW fusion power can be achieved and advanced plasma performance can be obtained.
In consideration of the maximum magnetic field of TF coils of CFETR-phase II, a high performance Nb3Sn CICC magnet was designed which can withstand 14-15 T. In order to save the space for blanket system and increase Ohmic heating flux, a high temperature superconducting Bi-2212 magnet with better current carrying performance under high field is considered for the central solenoid (CS) coils of CFETR-phase II. The HTS CS coils can provide a about 480V•s volt-seconds and the maximum magnetic field is about 17.5T. In addition, a Bi-2212 CICC conductor sample was tested at 4.2 K with critical current of 26.6 kA under its self-field.

Eligible for student paper award?

No

Authors: ZHENG, Jinxing (Institute of Plasma Physics, Chinese Academy of Sciences); Dr LU, Kun (Institute of Plasma Physics, Chinese Academy of Sciences); Prof. SONG, Yuntao (Institute of Plasma Physics, Chinese Academy of Sciences); Dr LIU, Xufeng (Institute of Plasma Physics, Chinese Academy of Sciences); Prof. WAN, Baonian (Institute of Plasma Physics, Chinese Academy of Sciences); Prof. LI, Jiangang (Institute of Plasma Physics, Chinese Academy of Sciences); Prof. WAN, Yuanxi (Institute of Plasma Physics, Chinese Academy of Sciences); Dr WEI, Jing (Institute of Plasma Physics, Chinese Academy of Sciences); Dr LIU, Huajun (Institute of Plasma Physics, Chinese Academy of Sciences)

Co-authors: Prof. HUTCH, Neilson (Princeton Plasma Physics Laboratory, Princeton University); Mr TITUS, Peter (Princeton Plasma Physics Laboratory); BROWN, Thomas (Princeton Plasma Physics Laboratory, Princeton University); Dr ZHAI, Yuhu (Princeton Plasma Physics Laboratory)

Presenter: ZHENG, Jinxing (Institute of Plasma Physics, Chinese Academy of Sciences)

Session Classification: W.OP1: Magnets

Track Classification: Magnets