



Contribution ID: 573

Type: Poster

FTP/4-4Rc: Current Progress of Chinese Solid Breeder TBM

Friday, 12 October 2012 08:30 (4 hours)

The helium-cooled/solid breeder with the pebble bed concept has been adopted in Chinese ITER test blanket modules (TBM) design. The structure dimension of HCCB TBM design is based on 1/2 ITER test port divided vertically. In order to reduce the effects of magnetic field ripple, the design was updated with reduced RAFM steel mass. The arrangement of pebble beds in the sub-module is changed from the original transverse direction to the current vertical direction. In this updated design, each sub-module has cooling plates fed in parallel by high pressure Helium. Flow-rates of He coolant are controlled by the coolant bypass system between first-wall and sub-modules. Updated design were exhibited that the coolant flow of FW has been changed from the toroidal direction to the poloidal direction; and every 3 coolant channels are to form a cooling loop, and there are 9 loops in total inside the FW. Moreover, a modification for sub-module has also considered, the number of tritium breeding zone and neutron multiplier zones consist of 2 zones and 3 zones, respectively. Some test facilities including electro-magnetism test facility and helium test loop are being built in China. Relevant R&D on the key issues of the tritium system, RAFM steel structure material, function materials including the solid tritium breeder and neutron multiplier as well as the tritium permeation barriers, are being conducted in China. Chinese Low-activated Ferritic/martensitic steel, CLF-1, as TBM structural materials is developing towards industrially level. Exploration study of neutron multiplier Be pebbles fabrication technology has been done. Be pebbles are produced by the rotating electrode process (REP). The lithium orthosilicates tritium breeding materials of HCCB TBM have been fabricated at laboratory level. The design of a test helium loop working at high pressure (8MPa) and high temperature (550°C) prior to TBMs installation in ITER have been completed. In addition, Chinese HCCB TBM will be tested in Port #2 with the India Liquid Lithium Ceramic Breeder (LLCB) TBM simultaneously. Two TBMs and its associated ancillary systems will be integrated on the same Port as well as interfaced with ITER buildings and systems.

Country or International Organization of Primary Author

China

Primary author: Mr FENG, Kaiming (China)

Co-authors: Mr XIANG, Bin (Southwestern Institute of Physics); Dr WANG, Fen (Southwestern Institute of Physics); Mr ZHAO, Fengchao (Southwestern Institute of Physics); Mr HU, Gang (Southwestern Institute of Physics); Mr ZHANG, Guoshu (Southwestern Institute of Physics); Dr ZHANG, Long (Southwestern Institute of Physics); Mr ZHANG, Mingchun (Southwestern Institute of Physics); Dr WANG, Pinghuai (Southwestern Institute of Physics); Mr WANG, Qijie (Southwestern Institute of Physics); Mr CAO, Qixiang (Southwestern Institute of Physics); Mr LUO, Tianyong (Southwestern Institute of Physics); Mr YE, Xingfu (Southwestern Institute of Physics); Mr CHEN, Yanjing (Southwestern Institute of Physics); Mr FENG, Yongjin (Southwestern Institute of Physics); Mr ZHONG, Yuan (Southwestern Institute of Physics); Dr LI, Zaixin (Southwestern Institute of Physics); Mr ZHAO, Zhou (Southwestern Institute of Physics)

Presenter: Mr FENG, Kaiming (China)

Session Classification: Poster: P7

Track Classification: ITR - ITER Activities