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P2.192 Design of Chinese Demo Blanket Concepts and R&D Progress of DFLL TBM

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China has long been active in pushing forward the fusion energy development to the demonstration of electricity generation. As one of the most challenging components in DEMO, great efforts have been put on the development of breeder blanket and three blanket schemes were studied in China for fusion engineering test complementary with ITER (International Thermonuclear Experimental Reactor). In this paper, the main blanket concepts developed in China will be summarized including two leading schemes of Dual Functional Lead Lithium (DFLL) and Helium Cooled Ceramic Breeder (HCCB).

For ITER-TBM (Test Blanket Module), the Procurement Agreements of HCCB-TBM has now been confirmed and led by three institutes, i.e. SWIP (Southwest institute of Physics), INEST (Institute of Nuclear Energy Safety Technology) and CAEP (Chinese Academy of Engineering Physics), each playing a different role. The other candidate scheme, DFLL-TBM has also been continuously supported by CN-MOST (Ministry of Science and Technology) and will be tested in ITER under international cooperation.

The technical challenges to ITER-TBM and also the DEMO mainly focus on fusion material development and testing, breeder/coolant technology and experiment validation, effective tritium production/extraction to achieve self-sufficiency, reliability and safety etc., which are the nuclear technology basis of DEMO blanket. In this paper, the recent R&D progress on DFLL-TBM is presented, including the progress on structural material fabrication technologies and properties of CLAM steel, PbLi/He coolant technology and safety issues, the RAMI analysis, small mockup neutronics experiments, and tritium behavior etc.. Based on the conceptual design and latest technical R&D progress, the entire test planning will be scheduled for DFLL concepts towards DEMO blanket.

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