



Contribution ID: 98

Type: Invited Oral

## Progress in design activities related to the water cooled breeder blanket for CFETR Phase-I

Wednesday 7 June 2017 16:00 (20 minutes)

The Chinese Fusion Engineering Testing Reactor (CFETR) is the next device in the roadmap for the realization of fusion energy in China. It will be operated in two phases. The fusion power is up to 200MW for Phase-I and will be over 1GW for Phase-II. The water cooled breeder blanket (WCCB) is one of three candidates.

The WCCB modules surrounding the plasma and its primary heat transfer system (PHTS) have been designed for Phase-I. The blanket module features are that the cooling plates and the breeder zone are parallel to the first wall (FW); purge gas is directed in the toroidal direction to reduce its pressure drop; the mixed breeder of  $\text{Li}_2\text{TiO}_3$  and  $\text{Be}_{12}\text{Ti}$  are chosen as tritium breeder and primary neutron multiplier, a bit of Be as supplement of multiplying neutrons, RAFM steel as structural material, tungsten as armor material of the FW. Pressurized water of 15.5MPa is chosen as coolant with 285oC inlet/325oC outlet. The performance analyses related to neutronics, thermohydraulics, and mechanics have been performed for the whole three-dimension geometry of typical blanket module. In order to support the design of the WCCB, the flow characteristic of purge gas in the WCCB mixed pebble bed is studied. The safety issues related to tritium, water activation, and accidents are also assessed and some mitigation measures are recommended. In addition, the fabrication process of the FW with tungsten armor of the WCCB is being developed. In this paper, the above-mentioned design activities will be introduced.

### Eligible for student paper award?

No

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**Session Classification:** W.OP3: Blankets and Tritium Breeding: Solid Breeders

**Track Classification:** Blankets and tritium breeding