IFERC Newsletter

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International Fusion Energy Research Centre, Rokkasho, Aomori 039-3212, Japan

Status of DEMO Design Activity

Highlights on BB design and T extraction and removal

Concerning the development of conceptual Breeding Blanket (BB) design, the definition of the requirements (e.g., Tritium Breeding Ratio, safety, reliability, maintenance, dimension, and position) continued, as well as the definition of the load specification document for both EU and JA.

A cylindrical concept with a Beryllide ($Be_{12}Ti$) block was further explored as the JA DEMO BB design. A flow analysis of the main cooling channel was performed for the central cooling piping concept as shown in Fig.-1.

No stagnant water area was identified, and the coolant water conditions (temperature and pressure drop) were found to be within the design limit.

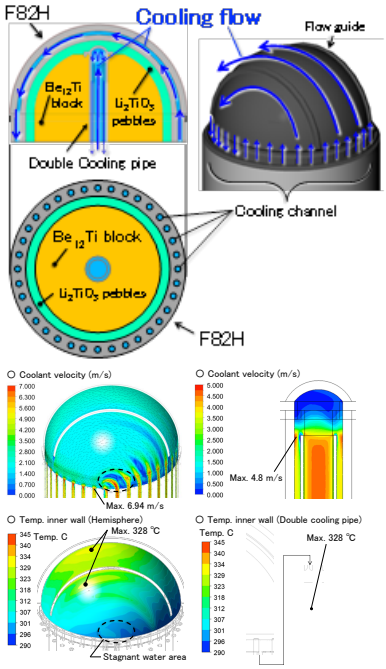

Fig.-1: (Upper) Flow path and configuration of main cooling channel, and (Lower) flow analysis of main cooling channel

Assessment of loads on BB considering the electro-magnetic force have been continued. The total load on the vacuum vessel due to maxwell forces on the ferromagnetic blanket is under study, which could give an additional design limit to BB.

The effect of the Double Walled Tube (DWT) plugging on the Water Cooled Lithium Lead (WCLL) performances has been investigated and structural analyses of the WCLL Left Outboard Blanket (LOB) segment (Fig.-2) have been performed, while for the Helium Cooled Pebble Bed (HCPB) BB, a sound high-pressure purge gas was established to improve the reliability avoiding to have weldings between coolant and purge with a sealing function.

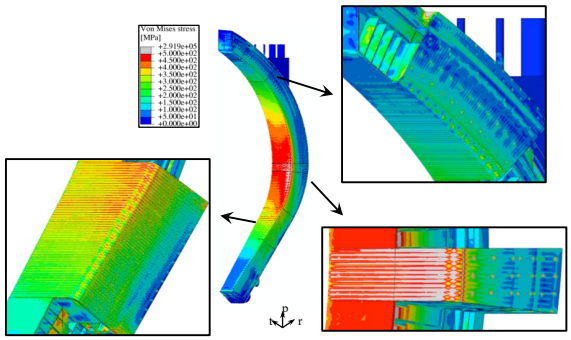

Fig.-2: Overview of the WCLL LOB segment and the structural analysis

The sub-modeling procedure developed in previous tasks has been successfully applied to the WCLL and HCPB BB design (Fig.-3) by analyzing the electromagnetic loads acting on an equatorial slice of the Central Outboard Blanket (OBC) segment during a plasma disruption.

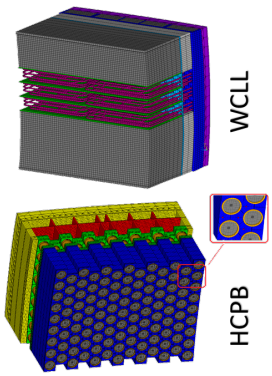

Fig.-3: Schematic pictures of WCLL and HCPB

(DEMO Design Task-3 TROs)