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Accomplishment of DEMO R&D Activity of IFERC Project in BA activity and strategy toward DEMO & Progress of conceptual design study on Japanese DEMO

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A. International Fusion Energy Research Centre (IFERC) has implemented DEMO research and development activities for 10 years under the Broader Approach (BA) activity. Five common issues on blanket technologies were selected and corresponding R&D has been carried out. The accomplishments of R&D were; successful production of reduced activation ferritic/martensitic steel in DEMO scale production technology, preparation of SiC/SiC composite material property handbook as the functional structural material in the advanced blanket concept, a major technical breakthrough on the fabrication of beryllide pebbles as the advanced neutron multipliers, successful fabrication and demonstration of Li rich Li-titanate pebbles as the advanced tritium breeder, and the development of a new scintillation system as a tritium analysis tool and first analyses of retained hydrogen isotope and beryllium on dust particles of JET ITER like wall. Interaction with DEMO design activity reveals the severe needs for further R&D to qualify these developed technologies as the concrete technical background of the DEMO design.

B. This paper presents the recent progress of a conceptual DEMO design in Japan. First, the divertor concept is built under the feasible engineering technology. Second, the circulating power in DEMO is precisely investigated as for the cooling power and the water detritiation system to ensure the substantial net electric power. Then, 3D eddy current analysis shows the prospect for plasma elongation ~ 1.7 and increase the electric power output. Finally, safety analysis on an ex-vessel LOCA is carried out, and it is found that a vault of the tokamak cooling water system (TCWS) with a pressure suppression system (PSS) can mitigate it.

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