

BA後の原型炉開発に向けた六ヶ所の展開

Future plan of the Rokkasho site toward the DEMO development

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Introduction

In the Rokkasho site, the International Fusion Energy Research Centre (IFERC) project and the International Fusion Materials Irradiation Facility/Engineering Validation and Engineering Design Activities (IFMIF/EVEDA) project are on going under the Broader Approach framework. BA is a ten years program from June 2007 except the Satellite Tokamak Project (JT-60SA) which is extended to the end of 2019 according to the delay of the first plasma. It is just a middle point of the BA activities in the Rokkasho site, so we have started discussion on the later half of the BA activities and later. Here present status of the BA activities in the Rokkasho site are reviewed and the future prospects are also introduced.

DEMO R&D and Design

Based on the common interests of the EU and Japan in DEMO, R&D on reduced activation ferritic/martensitic (RAFM) steels as structural material, SiCf/SiC composites as a flow channel insert material and/or alternative structural material, advanced tritium breeders and neutron multipliers, and tritium technology relevant to the DEMO operational condition are carried out. In 2012, a peer review of the DEMO R&D recommended the continuation of the five present R&D tasks and four new tasks of SiC, SiC/SiC-LiPb compatibility, tritium recovery test under 14 MeV neutrons, estimation of design windows related to material properties and Safety research on the plasma facing components. In the DEMO design, EU and JA joint work has been conducted since 2011 and the safety study for fusion power plant has been initiated since 2012. DEMO design and R&D works are expected to be enhanced to an engineering phase toward DEMO as domestic activities after BA. Of course, international collaborations will not be excluded.

Computational Simulation Center (CSC) and ITER Remote Experimentation Center (REC)

CSC with a supercomputer of 1.23 Pflops LINPAC performance started operation January 2012, which provides powerful infrastructure not only for the plasma physics but also fusion reactor engineering. CSC will be terminated at the end of 2016, however, the replacement of the supercomputer is not planed so far. The preparatory working group on REC issued the overall plan of REC in October 2012, which shows the equipment of REC will be prepared within the BA framework and will be tested by using existing machines until the initiation of the JT-60SA and ITER operations.

IFMIF/EVEDA

The IFMIF prototype accelerator will be constructed in the Rokkasho site, which consists an injector, RFQ and SRF linac. The injector, RFQ and SRF linac will be delivered Rokkasho in March 2013, 2014 and 2015, respectively. An integration beam test will be carried out from middle 2016 to the end of the BA period. This accelerator is regarded as one of the most important property of BA not only for the IFMIF construction but also DEMO engineering, which is a common understanding between EU and Japan. Technical possibility of the utilization of the IFMIF prototype accelerator is under discussion.