"VALIDATION AND DESIGN ACTIVITIES OVERVIEW FOR THE DEVELOPMENT OF THE IFMIF RADIATION-TESTING MODULES"

(Part of the Belgian contribution to the Broader Approach)

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Belgium has decided to join the Broader Approach agreement. SCK•CEN (the Belgian nuclear research centre) has been designated by the Belgian Government to lead and coordinate the Belgian in-kind contributions in this field. Three main tasks are directly performed within SCK•CEN itself, all related to the engineering of the test cell:

- Irradiation of IFMIF High Flux Test Modules (HFTM) test rigs in the Belgian reactor BR2, for validation purposes.
- Preliminary design of the start-up module (STUM).
- Conceptual design of the low flux test module (LFTM).

The irradiation in the high flux BR2 reactor (Mol, Belgium) will allow validating the design of the HFTM-V (vertical lay-out) and is mostly focused on the heating system and the instrumentation performance and endurance under intense neutron flux. The irradiation device will also permit to test the HFTM-H (horizontal layout) concept, intended to work at 1000°C under neutrons. It will also embark some micro fission chambers for endurance testing and some optical fibre sensors intended to be used for in-situ radiation flux monitoring within the start-up module development.

The STUM is designed similar to the HFTM in order to reproduce the instantaneous irradiation conditions (flux, flux shape, temperature, etc.) of the samples. The STUM will be loaded during the commissioning phase of the installation and will simulate the HFTM while monitoring the various parameters for characterizing the facility. The preliminary design aims at defining the parameters to be monitored and the adequate instrumentation to reach this goal in the very harsh environment. The paper reports on these preliminary design and instrumentation development.

Finally the Low Flux Test Module was only rapidly sketched within the Comprehensive design report[1] of the IFMIF facility issued by the IEA in 2004. The main objective of this task is to determine the irradiation conditions in this part of the test facility (neutron flux, spectrum and shape) and the corresponding components in a DEMO facility, for which these conditions will be representative. Using these data, a first conceptual design of the LFTM, taking into account the updated test facility design, will be issued.

[1] IFMIF Comprehensive design Report; IEA report, IFMIF International team, January 2004

This article describes the philosophy and the goals behind those three tasks, the studies about the technologies to be used, and presents the status of the undertaken actions and the planning for the three coming years.