ADS Roadmap in Japan

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After the accident at Fukushima-Daiichi Nuclear Power Plant (NPP), current cabinet of Japan decided to utilize existing NPP by giving the highest priority to safety. It is also recommended to enhance the activities to reduce the radiological burden of high level wastes (HLW) using both Fast Breeder Reactors (FBR) and Accelerator-driven Systems (ADS).

In Japan, Japan Atomic Energy Agency (JAEA), a core organization of this research field, precedes R&Ds to reduce the radiological hazard of HLWs by Partitioning and Transmutation (P-T) technology[1]. JAEA's reference design of ADS is a tank-type subcritical reactor driven by injecting 1.5 GeV-30 MW proton beam, where lead-bismuth eutectic alloy is used as both primary coolant and the spallation target. About 2,500 kg of MA is loaded in the core and 10% of them can be transmuted annually. The maximum k_{eff} during whole burnup cycles was set to 0.97. The burnup reactivity change in whole cycles is about 3 % Δk/k.

Within the framework of the J-PARC project that is promoted by JAEA and High Energy Accelerator Research Organization (KEK), JAEA plans to construct the Transmutation Experimental Facility (TEF) to study the transmutation technologies which includes the minor actinide (MA) transmutation in both FBR and ADS. TEF locates at the end of LINAC, which is also important components to be developed for future ADS. TEF shares the proton beam from LINAC with other experimental facilities in J-PARC.

In the presentation, the roadmap to establish ADS transmuter, necessary facility and activities will be described.

Reference

[1] National Review of P-T website,
http:// http://www.mext.go.jp/b_menu/shingi/gijyutu/gijyutu2/070/ (2013).