Development of Metal Fuel Fast Reactor in CRIEPI

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Research and development for practical use of fast reactor (FR) fuel cycle in Japan have been pursued focusing on the main concept consisting of mixed oxide fuel FR and aqueous reprocessing technologies and its complementary concept consisting of metal fuel FR and pyro-reprocessing technologies. The former has been developed mainly by the Japan Atomic Energy Agency (JAEA) in international cooperation with France and accumulates the most abundant domestic experience. The latter, on the other hand, has high potential for improving core safety, economy and flexibility to future uncertainties, and has been developed as the main concept in the United States and South Korea. The Central Research Institute of Electric Power Industry (CRIEPI), which has a technical base, is engaged in metal fuel development, core design study and pyro-metallurgical technology development in Japan. Furthermore, the importance of and expectation to metal fuel cycle technology are increasing in these days since a metal fuel FR was selected as the candidate for versatile test reactor (VTR) which will be newly constructed in 2026 at the earliest by the U.S. Department of Energy (DOE).

This presentation outlines the characteristics of FR metal fuels and introduces the current status of the development of U-Pu-Zr fuels, including MA-containing alloys, which are studied for future high-performance fuel cycle. In addition, the core neutronics design and safety characteristics of metal fuel FR that makes good use of the fuel property will also be summarized.

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