

Status and plans for critical facility modified-STACY/臨界集合体 STACY 更新炉の現状と 今後の計画

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In the TEPCO's Fukushima Daiichi Nuclear Power Plant accident, fuel debris was formed by fuel melting and mixing with in-core structures. Although the detailed properties of the fuel debris are still unknown, it is thought to contain materials such as iron and concrete. Then, in order to understand the criticality characteristics of fuel debris, JAEA is conducting a comprehensive numerical analysis assuming the composition of fuel debris containing concrete and iron. However, integral experimental data including these materials are scarce, and the validation of the analytical results has not been fully investigated. Thus, JAEA modified the criticality facility STACY in order to obtain experimental data that will contribute to the validation. This report describes the outline and status of the modified-STACY, and the plan is also presented.

The modified-STACY core is assembled in the open-top core tank using fuel rods and light water moderator. Each fuel rods consists of a zirconium alloy clad tube (9.5 mm outer diameter) and UO₂ pellets. Experimental apparatus can be loaded inside the core within the scope of the license. The water level controls the core reactivity, and the critical water level data are obtained. The modification of the STACY was completed in December 2023 and its first criticality was achieved in April 2024. Experimental campaign for investigation of characteristics of the fuel debris was started in August 2024, and the experiments are currently being conducted in the core consisting only of fuel rods and light water moderators.

Experiments on the core containing the structural materials will be conducted in January 2025. In these experiments, stainless steel rods of the same size as the fuel rods and Al cladding tubes of the same size filled with a concrete simulant will be used as the experimental apparatus to simulate the structural materials. By using them, the effects of contaminants such as iron, silicon, and calcium on criticality will be investigated. In addition, the presentation will also report on plans after the debris experiment is completed.

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