



Innovative Nuclear Reactor Concepts and Criticality Safety for Fukushima-Daiichi NPS Decommissioning

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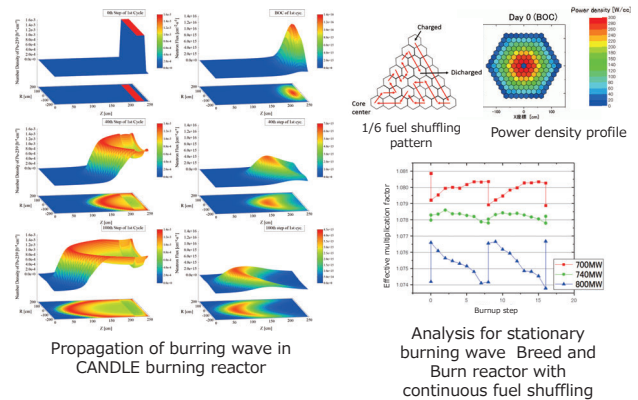
We are performing the study of innovative nuclear systems which solve the global problems in energy and environment and the study for the safe decommissioning of Fukushima Daiichi NPS.

1. Study on small Breed and Burn fast reactors

In general, fast reactors can utilize uranium resources effectively, but they need reprocessing facilities. Breed and Burn fast reactors use natural uranium or depleted uranium as the fuel without using reprocessing facilities with reducing the amount of radioactive waste. We are focusing on the study for small Breed and Burn fast reactors with passive safety feature.

Research topics

- CANDLE burning reactor with melt-refining process
- Start-up core of CANDLE fast reactor with enriched uranium
- Start-up core of CANDLE fast reactor with plutonium from LWR
- Small CANDLE experiment reactor
- CANDLE burning reactor for exploration of deep space
- Stationary burning wave Breed and Burn reactor with continuous fuel shuffling

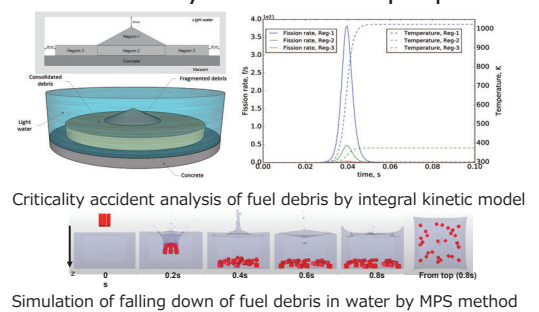


2. Study on criticality safety of fuel debris

We are performing critical safety study in the removal of fuel debris in Fukushima Daiichi NPS decommissioning. According to the experience of the decommissioning of TMI-2, it is necessary to cut and bite fuel debris in the decommissioning. The measure to prevent criticality accidents is proposed by analysis of the conditions that the multiplication factor becomes maximum in the operation. The effective safety measures are also investigated in the case of the criticality accidents.

Research topics

- Criticality accident analysis of fuel debris by integral kinetic model
- Criticality safety analysis including the fuel debris movement
- Improvement of analysis code using integral kinetic model



3. Study on small high temperature gas-cooled reactors

We are performing the study of small high temperature gas-cooled reactors, which use coated fuel particles. They can make the energy conversion efficiency high because of the high temperature outlet. It can use the uranium resource effectively. By the passive safety feature, it can be safe even in the blackout accident without operation of pumps nor injection of water.

Research topics

- Improvement of initial core of simple pebble-bed high temperature gas-cooled reactor
- Design study of modular pebble-bed high temperature gas-cooled reactor with rock like fuel (ROX)

