Prague, Czech Republic June 21-25, 2021

Contribution ID: **36** Type: **Oral presentation**

#04-36 Some Considerations on The Energy Deposition During a Ria Transient Based on Monte Carlo Simulations

Friday, June 25, 2021 3:20 PM (20 minutes)

Specific research reactors are capable of reproducing reactivity injection accidents in order to study the behavior of the nuclear fuel pins in accidental situations. The CABRI experimental pulse reactor, funded by IRSN (French Institute for Radioprotection and Nuclear Safety) and located at the Cadarache research center, is used to simulate power transients typical of reactivity initiated accidents. The fuel pin (test pin) to be examined is placed in the center of the core in a dedicated test loop. The pin is then subjected to a power transient, obtained by the fast depressurization of the 3He neutron absorber gas from the transient rods located in the core.

One of the central parameters of the experiment is the energy deposition in the test pin. This parameter however cannot be measured experimentally during a transient. Instead, it is assumed that the relative energy distribution between the core and the test pin is constant regardless the operational state of the reactor. Currently, this correlation between the energy deposition in the core and the test pin is measured and calculated in steady state and it is then applied to the transient. As such, the impact of the variations in the neutron flux, fuel and moderator temperature during the transient is assumed equivalent on the energy deposition in the core and in the test pin.

The aim of this paper is to present a methodological approach for the energy deposition calculation during a CABRI transient. The goal of this work is to improve our knowledge on the mechanisms involved in the transient energy deposition in the test pin. To achieve this goal, the first step is to determine the main parameters to which it is sensitive based on static Monte Carlo calculations. The results show that the transient energy deposition rate is mainly dependent on the helium pressure and the Doppler feedback.

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Session Classification: 04 Research Reactors and Particle Accelerators

Track Classification: 04 Research Reactors and Particle Accelerators