Determination of the Reactivity and the Reactor Period

TU Wien, Exercise TUW-07

Main topic: Reactor Physics

Keywords: reactivity, reactor period, control rod

Purpose: This experiment examines the effects of the control rods withdrawn during reactor operation. The change of reactivity and reactor period caused by control rods movements is observed. The participants
will learn the effect of control rods and their connection to reactivity.

Level of exercise: ☐Basic ☒Advanced ☐ Complex
Level of education: ☒BSc ☒MSc ☒PhD

What you will learn:
The participants will learn the effect of control rods and their connection to reactivity

Important information:
- Minimal size of student group: 4
- Maximal size of student group: 8
- Overall duration of the experiment (in wall clock hours): 3

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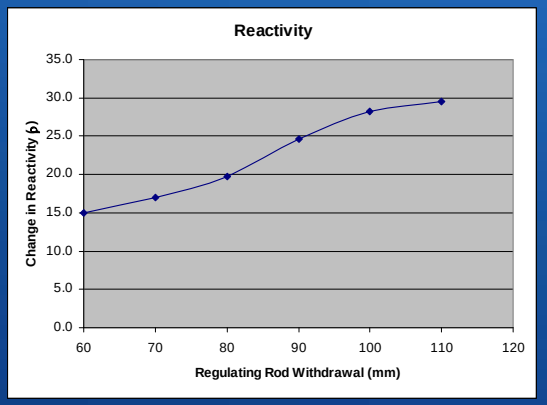
Possibility to perform experiment on demand: ☒Yes ☐ No
Frequency of occurrence: Once a year
Examination modalities: Participation in the experiment, protocol and final written test
Teaching languages: English/German

Pre-knowledge required: understanding in nuclear and reactor physics, radiation physics and protection.

Instruments required for exercise:

- Reactor I&C system;
- Several stop watches;
- A contamination monitor.



Execution:

- The reactor is brought to a power of 10 W.
- The regulating rod is withdrawn from its starting position to the first position of interest. The reactivity addition caused by this movement causes the reactor power to increase. The time, which takes the reactor power to rise its value by 50 is recorded in several steps.
- After obtaining the time periods the reactor power is again stabilized at 10 W, and the experiment is repeated for several rod positions.
- The reactor period T is obtained from the measured time periods and the reactivity.

Limitations:
This experiment will be conducted in a controlled radiation area. Hence. controlled radiation area limitations apply.