Reactivity Values of Fuel Elements

TU Wien, Exercise TUW-06

Main topic: Reactor Physics

Keywords: fuel elements, reactivity worth, reactivity, reactor core

Purpose: This exercise examines the reactivity worth of fuel elements on different positions in the reactor core. A visual representation of reactivity worth may be obtained by plotting the horizontal distance of the fuel element to the core centre against the excess reactivity. The participants will learn the meaning of reactivity worth of fuel elements. They will become familiar with the effect of the horizontal distance of fuel elements on the reactivity of the core.

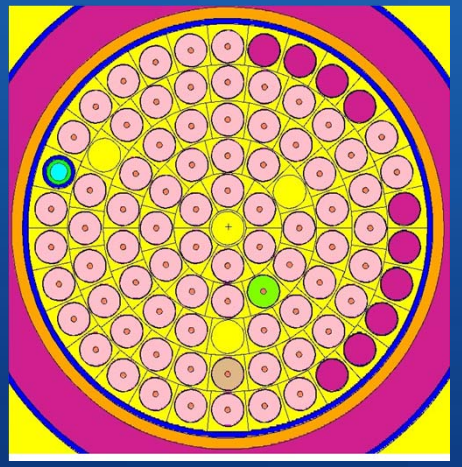
Level of exercise: ☐Basic ☒Advanced ☐ Complex
Level of education: ☒BSc ☒MSc ☒PhD

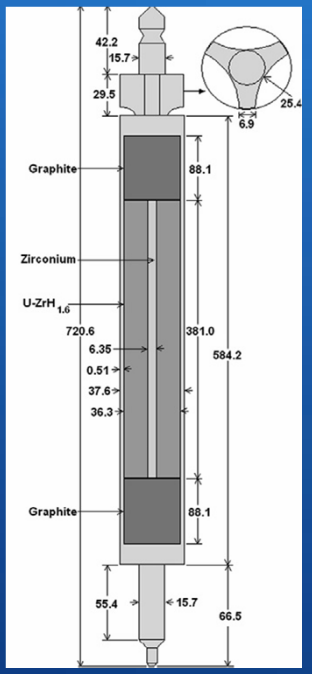
What you will learn:

During this experiment the participants will gain an understanding of reactivity worth of fuel elements. They will become familiar with the effect of the horizontal distance of fuel elements on the reactivity of the core.

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

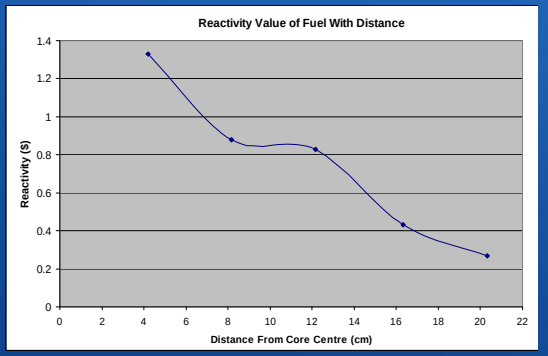
Pre-knowledge required: understanding in nuclear and reactor physics, radiation physics and protection.

Instruments required for exercise:

- Reactor I&C system;
- Fuel handling tool for the operator;
- A contamination monitor.

Execution:

- During operation, the fuel element to be measured is removed from the reactor core and stored into the fuel storage rack.
- Because of the decrease in fuel amount from the critical core, the reactor power is decreased.
- The automatic control system adjusts the regulating rod positions again to bring the reactor back to the same power level.
- The difference of two regulating rod positions (before and after withdrawal of a fuel element) is expressed in terms of reactivity values by using the regulating rod calibration curve.
- The experiment is repeated with fuel elements in different positions and also if possible with reflector elements.



Limitations:

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