

BME Training Reactor, Exercise BME-03

Main topic: Reactor Physics /Reactivity coefficients

Keywords: void reactivity coefficient, thermal neutron flux, adjoint flux, perturbation theory

Purpose: The experiment is aimed at learning the experimental technique that is used to determine the space-dependence of void effect. During the experiment, the reactor is maintained in the critical state by an automatic reactivity control system. In order to evaluate the results of the experiment, the students must understand the use of control rod calibration curves. During the evaluation of the experiment, the difference between the global and local void coefficient is analyzed and the importance of the negative value of void coefficient is emphasized.

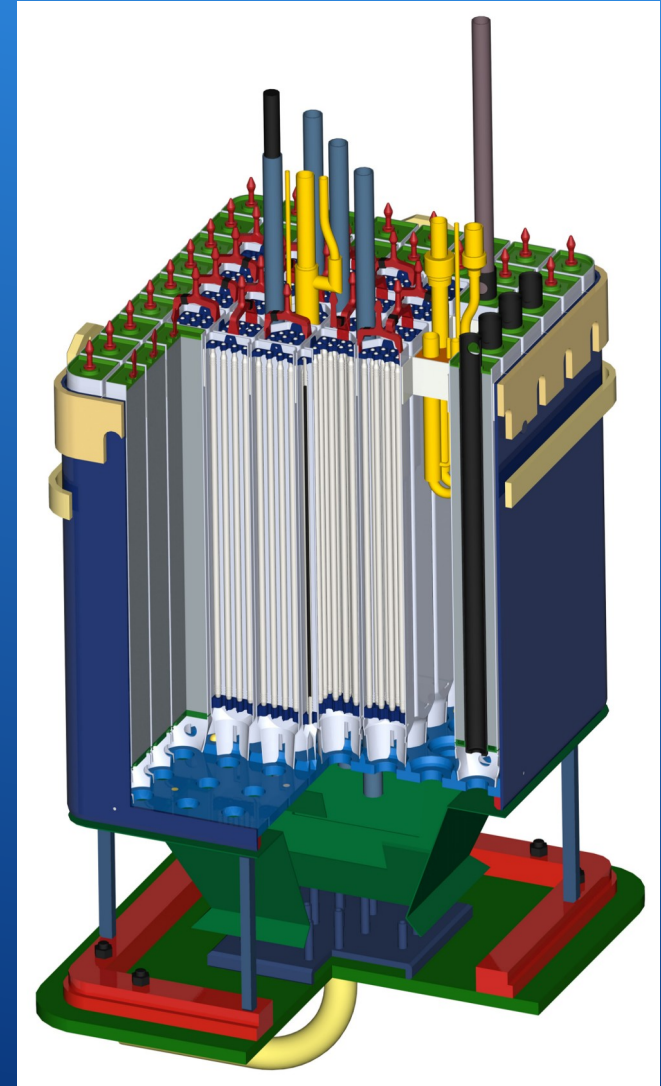
Level of exercise: Basic Advanced Complex
Level of education: BSc MSc PhD

What you will learn:

The students will learn how to determine the space dependent void coefficient in the reactor core. They also learn the effect of small changes in criticality, the application of control rod curves and the importance of having negative void coefficient

Important information:

- Minimal size of student group: 2
- Maximal size of student group: 6
- Overall duration of the experiment (in wall clock hours): 3-4



BME Training Reactor, Exercise BME-03

Possibility to perform experiment on demand: Yes No

Frequency of occurrence: 10-12 times per year

Examination modalities: short test before measurement, experiment report after

Teaching languages: English, Hungarian

Pre-knowledge required: Basics on reactor physics, reactivity, reactivity coefficients, reactivity control, basics of perturbation theory, adjoint flux

Instruments required for exercise:

- Reactor and its neutron monitoring and reactivity control systems.
- Plexi-glass rod, containing a hermetically closed air filled void of about 1 cm² cross section and 10 cm length.
- Reactivity worth calibration curve of the automatic control rod.

Execution:

- The reactor is set critical at a low power level. The manual control rod is being kept in a fixed position.
- The reactivity changes caused by a void (10 cm³ air filled space in a plexi-glass rod), the position of which is varied in the core in 5 cm steps vertically, are determined by using the calibration curve of the automatic control rod

Limitations:

None.

