

Neutron flux distribution measurement

Czech Technical University in Prague, Experiment CTU03

Main topic: Experimental reactor physics

Keywords: VR-1 reactor, neutron flux distribution, neutron activation, ionisation chamber

Purpose: The neutron flux distribution in the core of a research reactor is a complicated phenomenon and it is closely connected with a neutron spectrum of a research reactor, which is also very complicated. At a reactor the thermal neutron flux distribution is usually measured because it has the highest influence on reactor safety. The other two distributions (epithermal and fast neutron flux distributions), are measured less frequently.

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

What you will learn:

Learning objective of the experiment is to learn and to understand the role of neutron flux distribution in order to understand safe reactor operation. The experiment is highly suitable for students studying nuclear engineering as the major curriculum and it is suitable for students studying various major engineering curricula as such as power engineering, mechanical engineering, electrical engineering with future assignment in various nuclear curricula.

Important information:

- Minimal size of student group: 4
- Maximal size of student group: 10
- Overall duration of the experiment (in wall clock hours): 1.5-3.0



Possibility to perform experiment on demand: Yes No
 Frequency of occurrence: On demand, ca 30 times/year
 Examination modalities: Protocol, evaluation, discussion
 Teaching languages: English, Czech

Pre-knowledge required: The student should be familiar with introduction to reactor physics, particularly with theory of thermal neutron flux distribution at a reactor, and with neutron detection. Prior to this experiment, CTU02 - Neutron detection should be performed.

Instruments required for exercise:

- The VR-1 reactor
- Neutron detection system for education and training

Execution:

At the VR-1 reactor, thermal neutron flux distribution is carried out by both methods: by using small-sized ionisation chambers and by using neutron activation (foils or wires). Lecturer chooses one of these two methods which is more appropriate for the students' curricula.

Limitations:

No particular limitation for this experiment, only general requirements for entry to research nuclear installation according to the Czech nuclear legislation should be fulfilled.

