

Main topic: Experimental reactor physics

Keywords: VR-1 reactor, reactor transients, reactor kinetics, reactor dynamics

Purpose: Basic reactor kinetics experiments (i.e. without significant feedback effects) usually deal with reactor behaviour in subcritical, critical and supercritical states without external neutron sources, or with external neutron sources in addition to a study of the basic properties of delayed neutrons. Basic reactor dynamics experiments (i.e. with significant feedback effects) usually deal with reactor behaviour with reactor feedback such as temperature reactivity effects or void reactivity effects.

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

What you will learn:

Learning objective of the experiment is to understand the reactor kinetics and dynamics 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): 3



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 basic understanding of reactor kinetics and reactor dynamics. Prior to this experiment, CTU02 - Neutron detection should be performed.

Instruments required for exercise:

- The VR-1 reactor and the VR-1 neutron source
- The instrumentation for bubble boiling simulation (void reactivity effects)
- The instrumentation for study of temperature reactivity effects
- Neutron detection system for education and training and training

Execution:

Introduction to reactor kinetics and dynamics at the VR-1 reactor demonstrates reactor behaviour during essential operational states of a nuclear reactor such as a reactor in subcritical, critical and supercritical states without external neutron source and with external neutron source. Lecturer chooses temperature reactivity effects experiments or void reactivity effects.

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.

