Abstracts
Journal "Problems of Nuclear Science and Engineering. Series: Physics of Nuclear Reactors", issue No. 3, 2024

UDC 621.039.566.2:621.039.564:681.5.08

Results of physical start-up second stage of research nuclear installation BR-K1M

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The results of updating the research nuclear installation BR-K1M (booster-reactor of «Kaskad» type, version 1, modernized) are reviewed. There are presented the results of researches obtained at the second stage of the installation physical startup, described the methods of measurements and results processing that were applied to determine basic parameters of the core, operational parameters and safety limits of the installation performance.

Key words: research nuclear installation, reactivity, prompt neutron pulse, delayed neutron pulse, stable period, top critical state, reactivity control elements.

EDN: ODOORP

UDC 621.039.55

Measurement of dynamic pressure in vessel of solution-type pulse reactor VIR-2M. Measurements and discussion of results

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The paper presents the results of measuring dynamic pressure in a fuel channel of solution-type research nuclear reactor VIR-2M, occurring during detonation gas burning and during reactor operation in a pulsed mode, with the aid of dynamic pressure transducer.

***Key words*:** detonating gas, dynamic pressure, pulsed mode, research nuclear reactor, research nuclear installation, radiolysis, static mode.

EDN: ZZDPNP

UDC 621.039.57

The mechanism of formation and development of the gas phase in the solution reactor core in static operation mode

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The phenomenon of multiple fusions of excited tracks of uranium fission fragments with radiolytic gas bubbles that appeared earlier on similar tracks is investigated. The distribution spectrum by the number of mergers of the new bubbles formed in this way is found. The bubble sizes averaged over the spectrum are determined. It is shown that the most probable number of mergers during the evolution of bubbles is three regardless of the fusion model (bubble track or bubble with bubble) being the basis of the study.

Key words: solution reactor, radiolytic boiling, tracks of fission fragments, mergers of bubbles, bubble spectrum.

EDN XEBVPI

UDC 621.039.51

Design-basis justification of the IGRIK-2 reactor neutronics and dynamic characteristics

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The reactor neutronics and fission pulse parameters were calculated for the manufactured IGRIK-2 reactor vessel considering the modified fuel solution composition.

Key words: reactor IGRIK-2, reactor neutronics, dynamic characteristics.

EDN: BEWAW

UDC 621.039

Application of Sjöstrand method at FKBN-3 to measure reactivity of multiplying systems

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Reactivity is one of basic experimental characteristics of multiplying systems studied in RFNC-VNIIEF on a critical facility FKBN-3. To exclude systematic error of the determined reactivity values several complementary measurement methods are required. The current paper is dedicated to the use of SJÖSTRAND method for measuring reactivity of compact multiplying systems with metal fissile materials. The method was checked on the assemblies of ^{235}U and ^{239}Pu.

Key words: multiplying system, core, fissile material, reactivity, SJÖSTRAND method, neutron detector, effective fraction of delayed neutrons.

EDN: BSLTOJ

UDC 621.039.519.4+621.039.55

On setting up experiments at the FKBN-2 assembly machine to verify the calculation methods of the RMSR

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To verify and certify neutron-physical codes as applied to the RMSR project, precision nuclear-physical experiments with multiplying systems are needed that simulate the RMSR core by the composition of materials and neutron-physical characteristics. One of the possible installations for conducting such experiments is the FKBN-2 assembly machine available at RFNC-VNIITF. The purpose of the work is to select and justify the implementation of precision nuclear-physical experiments to be held at FKBN-2, the results of which are intended to verify the calculation methods used in the development and creation of the RMSR. Based on the results of neutron-physical calculations performed using the PRIZMA program, which implements the Monte Carlo method, a set of multiplying systems containing lithium, fluorine, beryllium, plutonium and uranium was selected for critical and spectral precision experiments at FKBN-2. The implementation of critical and spectral experiments was selected and justified.

Key Words: molten salt reactor, minor actinide transmutation, RMSR, FKBN-2, critical experiments, spectral experiments, neutron-physical calculation, PRIZMA.

EDN: HKRKLK

UDC 621.039.51

A computational model of all-wave detectors to simulate measurements of the neutron counting rate

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A computational model of McKibben type all-wave detectors has been constructed to simulate measurements of the neutron counting rate at the FKBN-2 stand. The testing of the detector model was carried out using the Monte-Carlo method according to the PRIZMA program with neutron constants ENDF/B-VII.1 by comparing the results of calculations and calibration measurements performed with two neutron sources – californium (^{252}Cf) and plutonium-beryllium (^{238}Pu-Be).

Key words: all-wave detector, the number of counts, the number ^{3}He(*n*, *p*)T reactions.

EDN: FFQMOK

UDC 539.1.074 + 621.039.571.8(088)

Gas-filled and evacuated fission chamber - based channel for neutron fluence rate measurement

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The basic principles of building a measurement channel based on gas-filled and evacuated fission chambers for measuring the neutron fluence rate in the range from $3\cdot10^{2}$ to $1\cdot10^{17}$ sm^{-2}·s^{-1} are outlined. The measurement results in the IBR-2M reactor are presented.

Key words: neutron fluence rate, gas-filled fission chamber, evacuated fission chamber.

EDN: OEZLYK

UDC 621.039.519

Justification of the experimental setup to study the dynamic bending of a fuel rod in the NEPTUN pulsed reactor

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The distinctive feature of the designed pulsing reactor NEPTUN is the possible oscillatory instability, which arises from the presence of positive feedback on reactivity due to the dynamic bending of fuel elements (TVELs) resulting from their non-uniform heating during the fission pulse.

This study is dedicated to justifying the establishment of experiments on the pulse reactor BARS-5M, the results of which will be utilized for the verification of the dynamic bending model of the fuel element. Throughout the course of this work, an experimental setup has been proposed, measurement methods and instruments have been selected, and the design of the measuring device has been developed.

Key words: pulsed nuclear reactor, neptunium nitride, fuel rod, dynamic bending, induction sensor.

EDN: AXTOYF