

Abstracts

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UDC 621.039.55

**The History of Creation and Development of Pulsed Nuclear Reactors
of Bars Type**

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The paper gives a brief review of the history of pulsed nuclear reactors of BARS type.

Key Words: Pulsed Reactor, Core, Reflector.

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**The History of Creation and Development of Pulsed Nuclear Reactors
of ELIR, IGRIK, YAGUAR Types**

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The paper gives a brief review of the history of pulsed nuclear reactors of ELIR, IGRIK, YAGUAR type.

Key Words: Pulsed Reactor, Core, Reflector.

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**The History of Creation and Development of Pulsed Nuclear Reactors
of EBR Type**

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The paper gives a brief review of the history of pulsed nuclear reactors of EBR type.

Key Words: Pulsed Reactor, Core, Reflector.

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Experimental and Calculation Parameters of Benchmark Spherical Assemblies with Core Made of Metallic Plutonium (^{239}Pu (88%)) in α -Phase and Depleted Uranium Reflector

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Presented are results of analysis of critical experiments with metallic assemblies performed earlier in RFNC-VNIIEF on FKBN facility. These assemblies possess a core made of plutonium (^{239}Pu ($\approx 88\%$)) in α -phase and a $^{\text{depl}}\text{U}$ reflector. Critical ($k_{\text{eff}} = 1 \pm 0,0016$) parameters for the core and reflector are determined. Experimental values k_{eff} are compared to the calculated ones, obtained by the use of different nuclear data libraries (BAS, ENDF/B-7, JEF3, JENDL3.3, CENDL). Critical assemblies can be recommended as benchmark ones for their incorporating into the International reference book on Nuclear safety.

Key Words: Neutron, Critical Assembly, Core, Plutonium, Reflector, Depleted Uranium, Test Parameters, Reactivity, Efficient Multiplication Factor, Monte-Carlo Method, Nuclear Data Libraries.

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Research of Critical Parameters of Systems Made of High-Enriched Uranium and Copper

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The report presents results of critical experiments performed on a stand FKBN-2 for 18 multiplying systems made of highenriched uranium, copper and polyethylene. Here are briefly described critical assemblies, their calculation models and results of calculations of K_{eff} value by a program PRIZMA-D with neutron constants BAS, ENDF BV, ENDF BVI and ENDF BVII.

Key Words: Critical Experiment, Multiplying System, Critical Assembly, Calculation Models.

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Utilization of Non-Weapon Plutonium and High-Enriched Uranium with ^{233}U Isotope Production in VVER Type Reactors Using Thorium and Heavy Water

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Proposed is a method of joint utilization of non-weapon plutonium and high-enriched uranium in oxide thorium-uranium-plutonium fuel of water-moderated reactor with varying water composition (D_2O , H_2O), characterized by efficient ^{233}U isotope production, safe reactor operation as well as by comparatively simple implementation.

Key Words: Utilization of Non-Weapon Plutonium and High-Enriched Uranium; Water-Moderated Water-Cooled Reactor; Oxide Thorium-Uranium-Plutonium Fuel; Mixed Water Composition (D_2O , H_2O); Isotope ^{233}U ; Calculations; Cell Approximation.

UDC 539.377

Solutions of Dynamical Thermoelasticity Problems For Semi-Spherical Shell And Rod

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The presence of analytical solutions of dynamical thermoelasticity problems is important for algorithms of calculations of fast pulsed reactors. In this connection the real core structure elements usually are brought to the parts like a round disk, rod, a sphere, spherical shell and so on, allowing such solutions. The article presents analytical solutions of thermoelasticity problems for the semispherical shell with spatially uniform, time arbitrary temperature distribution and for the rod. The rod temperature dependence on the axial coordinate and time is arbitrary, but divided

Key Words: Fast Pulsed Reactors, Core Structure Elements, Analytical Solutions of Thermoelasticity Problems, Eigenfunction Expansion Method, Semi-Spherical Shell, Rod.

UDC 621.039.51.12:621.039.514

Specific Features of Neutron Field Formation in the Working Hall of Compact Core Reactor BR-1 (BR-1M)

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Presented are results of a detailed calculation study of neutron field formation peculiar features in the working hall of the reactor BR-1 (BR-1M) on the whole as well as two basic structural field components – leakage neutrons from the reactor core (source neutrons) and background neutrons, formed as a result of interaction between leakage neutrons and efficiently moderating medium of shielding walls of the reactor hall

and massive scatter elements in the reactor stand design. There are itemized special features of functional dependencies of fluence and average energy of source of neutron fluence and background neutrons from the positional field coordinate in the reactor hall. The results of calculation for neutron field on the whole are compared to the available experimental data.

Key Words: Calculation by Monte-Carlo Method, Field Neutrons, Source Neutrons, Background Neutrons, Neutron Fluence, Unit Fluence Spectrum, Average Energy.

UDC 539.1.074.8:621.039.571

High-Sensitivity Fast Neutron Detector KNK-2-7M

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There is given a brief design description of KNK-2-7M detector of fast neutrons. There are presented the results of detector studies in the mode of counting pulses of ^{237}Np nuclei fission in a radiator of a neutron-sensitive section and in the current mode when sectional currents of functional sections are separated. There are considered the determination possibilities of the effective number of ^{237}Np nuclei. The detector diagnostic capabilities in the count mode are demonstrated by the example of reference data analysis performed on the base of the characteristics of neutron fields in the working hall of BR-K1 nuclear reactor. The detector diagnostic capabilities in the current mode are illustrated by the results of ^{237}Np fission rate measurements. These data were obtained during BR-K1 nuclear reactor power startups implemented in the mode of generating fission pulses on delayed neutrons at the detector arrangement inside the zone cavity of the nuclear reactor under a wide variation of nuclear radiation fields.

Key words: gas-filled detector of ^{237}Np fission, nuclear reactor radiation field, count-current operating mode of detector, count adjustment, hardware-software registration system.

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Determination of Prompt Neutrons Lifetime in Multiplying Systems by Method of Decay Constant Differentiation

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Presented is an experimental-calculation method of determining lifetime of prompt neutrons in subcritical multiplying systems (MS). The method has been tested for 9 multiplying assemblies made of metallic uranium and plutonium. Experiments have been performed with the aid of NMIS software-hardware complex and calculations – by a program PRIZMA-D and PRIZMA with neutron constants from libraries BAS and ENDF BVII.

Key Words: Lifetime of Prompt Neutrons, Decay Constant, Programs PRIZMA-D and PRIZMA, Neutron Constants Libraries BAS, ENDF BVI, ENDF BVII, NMIS Software-Hardware Complex.

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Electronuclear Facilities and Nuclear Power Problems

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Here is given a detailed coverage of the subject of electronuclear facilities, contemplated as actual means for solving the important problems of nuclear power.

Key Words: Electronuclear Facility, Blanket, Accelerator, Accelerator Target, Transmutation of Radioactive Wastes, Methods for Electronuclear Facilities Calculation, Nuclear Power Problems.