

## Abstracts

Journal "Problems of Nuclear Science and Engineering. Series: Physics of Nuclear Reactors",  
issue No.4, 2023

UDC 621.038.05

### Algorithm of automatic power controller operation in reactor IKAR-M

*M.S. Majkov, A.M. Dyudyaev, S.A. Kimyaev, I.M. Piskorskii, V.M. Tsvetkov, D.A. Yunin,*  
FSUE «RFNC-VNIIEF», 607188, Sarov, Nizhny Novgorod region, Mira ave., 37

In the paper there is presented the algorithm of automatic power controller operation in reactor IKAR-M created on the base of a stand of critical assemblies IKAR-S. In the paper there are described: algorithms of control signal formation and results of their efficiency testing, kinetic model of reactor IKAR-M, schemes of using reactivity regulating working members, algorithm of selecting optimal rate of motion of the actuator of the reactivity regulating working member.

**Key words:** research nuclear installation, automatic power controller, kinetic model of nuclear reactor, control algorithm, control signal, reactivity regulating member.

UDC 531.787.913

### Measurement of dynamic pressure in a vessel of solution-type pulsed reactor VIR-2M. I. Preparatory activities

*A.A. Shcheglov, A.A. Pikulev, L.Yu. Glukhov, N.I. Moskvina, Ye.K. Buryakova, A.R. Dyagel', D.A. Yunin,*  
FSUE «RFNC-VNIIEF», 607188, Sarov, Nizhny Novgorod region, Mira ave., 37

The possibility of measuring dynamic pressure by sensor PS01 in above-fuel space of VIR-2M reactor vessel at fission pulse generation in the core is considered.

There was developed a device to fasten the sensor to a flange of the reactor fuel channel making it possible to estimate remotely tightness of sensor sealing, localize possible leakages and, if necessary, remove safely gaseous fission products to the reactor gas contour. The safety analysis of the planned experiment is performed.

There are presented the control measurement results of dynamic pressure created by a pneumatic system synchronized with reactor start-up under the effect of pulsed gamma-neutron radiation on the sensor.

**Key words:** dynamic pressure, nuclear research reactor, nuclear research installation, tightness, gamma-neutron radiation.

UDC 621.039.5

### Consequence analysis of accidents related to catalytic recombination system and/or gas contour depressurization of the promising nuclear research reactor

*A.V. Shurkaev, A.A. Pikulev, A.A. Kubasov, D.A. Yunin, A.D. Avdeev, A.R. Dyagel', S.O. Tabakov,*  
FSUE «RFNC-VNIIEF», 607188, Sarov, Nizhny Novgorod region, Mira ave., 37

For highly promising research solution-type reactor there are considered the consequences of gas contour and/or catalytic recombination system depressurization. There are obtained conservative estimations of radioactive noble gases outflow to reactor hall after a fission pulse generation as well as at the reactor operation at sustained power.

There are estimated the values of equivalent dose rates of external irradiation created by radioactive noble gases discharged to reactor halls. There are estimated the volumetric activity of radioactive noble gases and gamma-radiation dose rate created by radioactive noble gases in the halls of research nuclear installation, volumetric activity of daughter nuclides of radioactive noble gases created by iodine isotopes and daughter nuclides of radioactive noble gases entering human organisms of personnel of research nuclear installation during inhalation.

**Key words:** radioactive noble gases, research nuclear installation, iodine isotopes, aqueous pulsed reactors, external irradiation, internal irradiation, supply annual limit.

UDC 621.039.564+681.5.08

## **Control system of physical parameters as a part of reactor control system of research nuclear facility BR-K1M**

*A.V. Arapov, A.M. Dudyayev, V.S. Majornikov, G.N. Pikulina, I.M. Piskorskiy,  
N.V. Raspopov, A.B. Sokolov, V.A. Yuchnevich,*

FSUE «RFNC-VNIIEF», 607188, Sarov, Nizhny Novgorod region, Mira ave., 37

There are considered common principles and approaches for designing the control system of physical parameters as a part of the reactor control system (RCS) of research nuclear facility BRK-1M. The purpose of such systems is to measure and calculate main neutron-physical and technological parameters of a reactor and to generate control and alarm signals for other RCS subsystems. The article contains a brief description of all components of the control system and their structural and functional features.

**Key words:** research nuclear facility, reactor control system, control system of physical parameters, neutron-physical parameters, control channel, measuring path, control software.

UDC 621.039.564:539.1.084

## **Fading-correction of optical readings of gamma-dosimeters SO PD (DTS)-0.05/10 measured on $\lambda = 745$ nm within the post-irradiation interval up to 100 days long**

*A.S. Koshelev, Ye.Yu. Tarasova, A.Ye. Nikiforov,*

FSUE «RFNC-VNIIEF», 607188, Sarov, Nizhny Novgorod region, Mira ave., 37

In the interests of improving fading-correction formalism of optical readings of solid state glass detector SO PD (DTS)-0.05/10 widely used as radiation tracking dosimeter of irradiating procedures in reactor facilities of fsue «RFNC-VNIIEF», there was realized a full-scale experimental research within the range of dose effect from 100 kR to 1 MR followed by post-irradiation optical measurements in the interval from 1 to 100 days.

Basing on the experimental data obtained, there was advanced a fading-correction formalism for the light-transmission coefficient and density factor both in the analytical form and in the form of Excel-pattern. The approbation of the proposed forms of fading-correction was performed.

**Key words:** solid-state glass dosimeter SO PD (DTS)-0.05/10, post-irradiation variation of dosimeter readings (fading), digital spectrophotometer, wavelength  $\lambda = 745$  nm, light-transmission coefficient, absorbancy, formalism of optical parameters fading-correction.

UDC 621.039.5.0

## **Determination of the characteristics of neutron field of the IGRİK-2 reactor by the neutron activation method**

*A.R. Baphaev, V.I. Litvin, A. A. Kuzinskaya, L.S. Ershova,*

FSUE «RFNC-VNIIEF», 607188, Sarov, Nizhny Novgorod region, Mira ave., 37

The energy spectra of neutrons in the experimental channel, in the window and behind the biological protection of the core of the IGRİK-2 pulse nuclear reactor were measured by the neutron-activation method. About 15 neutron activation detectors were used. Restoration of neutron spectra is performed by minimizing directional discrepancy. A comparison of the main integral characteristics of the neutron field with numerical calculations of the Monte Carlo method is given.

**Key words:** pulse nuclear reactor, spectrum restoration, neutron activation method.