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MEASUREMENTS AND EVALUATION OF NUCLEAR DATA FOR FISSILE AND FERTILE ISOTOPES AS A PRESENT PHYSICAL PROBLEM. An analysis of the neutron cross-sections and transmission experimental data for heavy nuclei in unresolved resonance region and an evaluation of the group constants are the subjects of the paper.

RESONANCES SELF-SHIELDING FACTORS IN UNRESOLVED REGION OF ^{238}U . The method of many-group self shielding factors calculation for Doppler broadened model resonance cross-sections in unresolved region is proposed. Experimental data on neutron transmission through, uranium-238 samples and parameters of the model for estimated resonance self-shielding factors are analyzed.

GROUP CONSTANTS AND SELF-SHIELDING FACTORS FOR ^{239}Pu IN THE UNRESOLVED RESONANCE REGION. An analysis of the experimental transmission and fission self-indication data for ^{239}Pu in the unresolved resonance region is carried out. The ladder method for neutron cross-section generation (stochastic K-matrix method) on the base of the multi-level R-matrix formalism was used. The estimates of the mean resonance parameters and group constants for ^{239}Pu were obtained.

THE ANALYSIS OF UNCERTAINTIES OF GROUP CONSTANTS ALGORITHM PREPARATION IN PBR DESIGN CALCULATIONS. The estimations of group constant preparation method uncertainties, used for PBR design calculations had been obtained. On the base of the evaluated nuclear data files library, the detail calculation of neutron collision density in the 10 eV-10,5 MeV energy region for 8 compositions had been performed. The obtained neutron detailed spectrum is used for group constants calculations ($\Delta u \approx 0.8$), cross-section average spectrum, criticality and breeding parameters. That detailed neutron spectrum functionals are compared with the values of these functionals; calculated from the same neutron cross-section on the base of algorithms used in group constant preparation complexes BNAB-ARAMAKO (IPS) and MIM (NIIAB). It has been found out, that for some compositions experimentally investigated, the uncertainty of approximate constant preparation methods can substantially exceed the calculation uncertainty of the neutron spectrum functionals because of nuclear data uncertainty. For large breeder reactor compositions the uncertainty of approximate calculations is 1% for K_{eff} and 0,02 for BR (absolute units).

THE EFFECTIVE RESONANCE INTEGRAL OF ISOLATED BLOCK CONTAINING MIXTURES ^{232}Th AND INERT DILUTIVES. In this article the results of experimental measurement of effective resonance integrals of isolated blocks containing mixtures of ^{232}Th and inert dilutives are given.

MEASUREMENT OF A DIFFUSION LENGTH OF A GRAPHITE SYSTEM WITH THE HELP OF THE IMPROVED PRISM METHOD. Diffusion characteristics of a graphite system were measured with the help of the prism method with a geometrically small fast - neutron source. The choice of detectors optimal spacing on the base of experimental and computing information allowed to determine diffusion lengths with the error of $\pm 2\%$ (with confidential probability of 95%).

THE NEUTRON ENERGY SPECTRA ON BFS CRITICAL ASSEMBLIES. The comparison

of the experimental and calculational data is made concerning the neutron energy spectra in media for several reactor compositions. The measurements were carried out on BFS - facility for central uranium fueled test zones of critical assemblies. The experimental conditions were similar to those of infinite media. The time-of-flight and proton-recoil spectrometry methods (proportional counters and organic crystal detector) were used, allowing to overlope the overall energy region approximately 10 eV-10 MeV. The detailed spectrum calculations were based on the numerical solution of the slowing down equation with a rigorous kernel for elastic scattering energy loss. The neutron cross-sections library of Nuclear Data Center were used with the common set of about 14 000 energy points irregularly spaced to describe in a best way the resonance structure of neutron cross-sections of the main reactor materials. The reasons for divergency between experiment and calculation are discussed.

REACTIVITY EFFECTS IN FAST HETEROGENEOUS REACTORS. The principal safety parameters of a fast high-power reactor with a heterogeneous configuration of a core against the degree of heterogeneity, volume fractions of materials and the type of fuels used in the inner blanket regions have been considered. It has been investigated the relation between the values of Doppler and sodium void effects of reactivity from the viewpoint of a reactor self-regulation possibility in an emergency case.

THE POSSIBILITY OF SUPPRESSION OF SOME THRESHOLD REACTION RATE IN THE BLANKET OF HYBRID FUSION REACTOR. The possibility of suppressing the rate of the threshold reactions which result in the formation of high radioactive nuclides (^{232}U , ^{236}Pu , ^{238}Pu) in the fertile fuel zone of a hybrid fusion reactor is considered for high energy (5-14.1 MeV) using neutron lead interaction features: small capture, intensive elastic and inelastic scattering, back-scattering at slowdown. Threshold reaction rate suppression is achieved by introducing a lead layer between the first wall and fissile fertile zone.