

Neutron Spectrum Unfolding Method Based on Shifted Legendre Polynomials, Its Application to the IREN Facility

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The paper presents a method for unfolding the neutron energy spectrum from the results of measurements with a Bonner multi-sphere spectrometer. The method is based on solving the system of the Fredholm integral equation of the 1st kind using Tikhonov regularization and decomposing the spectrum into shifted Legendre polynomials. To obtain an optimal solution, an algorithm for selecting the regularization parameter and the number of polynomials is proposed. Spectra were reconstructed for rooms near the Intense Resonance Neutron Source (IREN) facility at JINR in the energy range from 10^{-8} to 63.1 MeV. The effective dose rate and ambient dose equivalent rate were estimated for the obtained spectra. Results are compared with the statistical regularization method (the RECONST software).