

A METHOD OF GAMMA-SPECTRUM PROCESSING BASED ON EXPONENTIAL SMOOTHING

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This paper proposes a new method to smooth out the spectral gamma-lines. Calibration samples supplied with the gamma spectrometer containing radioactive isotopes Eu152, Co60 and Na22 were used as test objects. The position, width and area of the peaks obtained as a result of spectrometry characterize the energy and intensity of gamma radiation. As is known, these peaks are superimposed on a continuous spectrum of energy resulting from secondary effects and background radiation [1].

The smoothing procedure was performed using interpolation by the system of uniform shifts of the Gaussian function [2]:

Since the standard interpolation procedure becomes highly unstable with increasing variance [3], regularization was applied. Results of the simulation indicate that the proposed method for filtering spectral lines does not introduce distortions into the original signal. On the other hand, the representation of spectral lines as a linear combination of Gaussian function shifts provides an additional opportunity for analytical calculations with a given signal during subsequent more detailed processing.

It is not necessary to pick the form of the peaks because they are represented as a sum of several shifts of the Gauss function with various amplitudes. As a result, a more versatile peak detection system has been obtained that does not require serious changes from one type of signal to another. A feature of the proposed method is that the peak areas for the original and smoothed signal may differ by around 10%, but with a significant change in the variance of the regularization parameter the area changes are small, which ensures the calculation robustness.

1. R. Gordon Gilmore .Practical Gamma-ray Spectrometry.2nd Edition. –Nuclear Training Services Ltd, John Wiley &Sons , Warrington, UK, 2008.
2. V.Maz'ya, G. Schmidt, AMS Mathematical Surveys and Monographs, 141, 350 (2007).
3. E.A.Kiselev, L.A.Minin, I.Y.Novikov and S.M.Sitnik, Math. Notes 96, 228, (2014).

The speaker is a student or young scientist

No

Section

1. Experimental and theoretical studies of nuclear reactions

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