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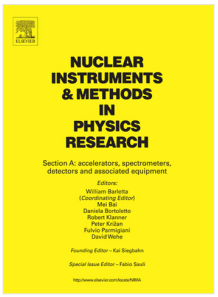

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Step-Approximation SNIP Background-Elimination Algorithm for HPGe Gamma Spectra

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Abstract: A step-approximation, statistics-sensitive nonlinear iterative peak-clipping background elimination algorithm with a clipping window adaptive to the full width at half-maximum is proposed. The calibration of the full width at half maximum was expressed as a square root of a quadratic function of energy. The relative differences of the background areas under a peak in successive iteration steps were used as the condition to end the iteration. The background area under a peak is calculated as a weighted sum of the background under the peak and the background in the immediate vicinity of the peak, obtained by the clipping method. The weights are given by the background under the peak and the number of counts in the original spectrum. The proposed algorithm was applied in ^{152}Eu and ^{137}Cs gamma spectra measured with a high-purity-germanium spectrometer. After background subtraction, the net peak area can be obtained from the net spectrum. It can be universally used for the gamma spectra given by a fixed detector, as long as the full width at half-maximum has been calibrated.

Keywords: Background elimination; Full width at half-maximum; High-purity-germanium spectrometer; Gamma spectra

1. Introduction

A high-purity-germanium (HPGe) spectrometer with high resolution has been routinely used in segmented gamma scanning (SGS) [1,2]. The SGS technique is a non-destructive analysis (NDA) method applied to nuclear waste drums using gamma radionuclide detection, in which gamma spectrum analysis is

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