Fig.3. Standard deviation of fluctuations for raw and PCA processed data against radon concentration.

In Fig.3 the computed standard deviations of fluctuations for raw and processed PCA data, ex-

pressed in Bq/m^3, plotted vs. radon concentration are given. It is seen that the PCA processing considerably reduces fluctuations, particularly for low radon concentrations. It may be expected, that an influence of fluctuations for the radon concentration of 100 Bq/m^3 can be reduced by a factor of 100.

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AN ATTEMPT TO USE WAVELET TRANSFORM FOR DENOISING XRF SPECTRA

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Wavelet transform is a novel signal - processing technique which has been recently used in several fields [1-4]. One of the most promising application of this technique for radiometric instruments is signal denoising. There is an important difference between denoising and smoothing. Whereas smoothing removes high frequencies and retains low frequencies, denoising attempts to remove whatever noise is present and retain whatever signal is present regardless of the frequency content of signal [5].

Feasibility study of applying Wavelet - based denoising techniques for processing data from an X-ray fluorescence analyser was prepared [6]. The data consisted of 34 experimental spectra collected

from an industrial in - stream XRF analyser designed for measurements of iron, zinc and lead content in the Zn-Pb ore processing products [7]. All calculations were performed using a software based on Wavelet Toolbox for Matlab [8].

Fig. shows some results of denoising XRF spectra with the Wavelet technique. The used algorithm was based on smoothing of the entire set of data in the best-basis for their variance spectrum by killing all Wavelet coefficients at scales informed by the user [4, 9]. It can be seen that the denoised spectra are smoother than the original ones and the removed noise has a mean value close to zero whereas its variance spectrum resembles the shape of the denoised spectra.
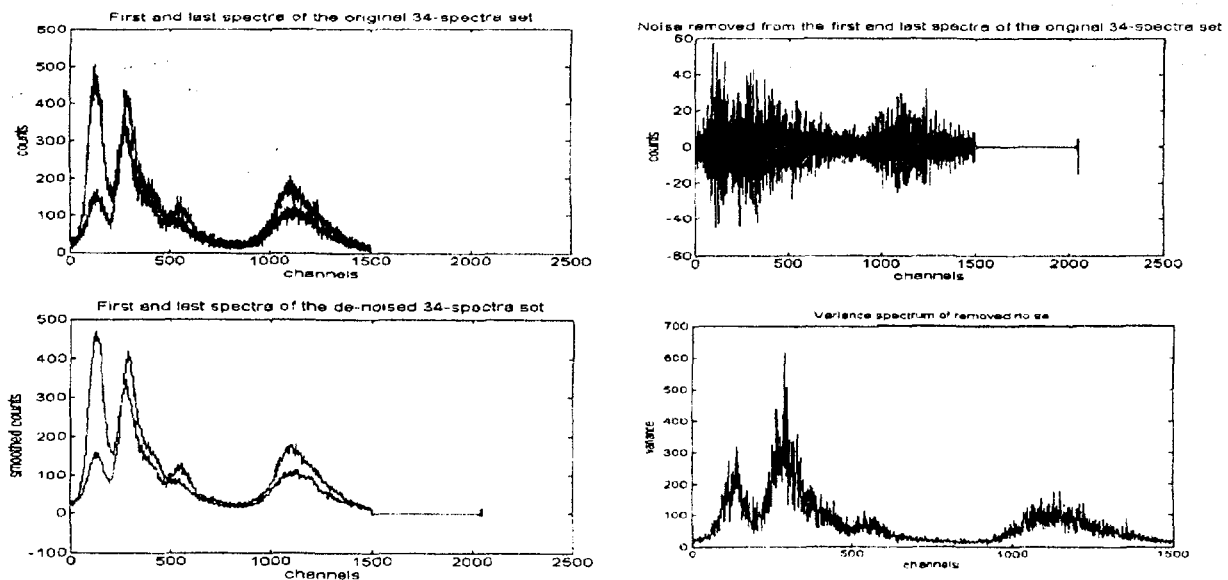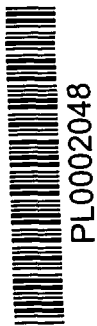
Fig. Denoising of some XRF spectra using Wavelet transform.

In the case of the signal from radiation detectors, observed fluctuations are caused by the statistical nature of the registered radiation and their variance should be equal to the number of accumulated counts. This can explain a similarity of the variance spectrum of the removed noise to the spectrum of registered radiation.

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PERFORMANCES OF LAE10 ACCELERATOR WITH A THREE ELECTRODE ELECTRON GUN WITHOUT MESH GRID

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The aim of this research was an accelerator with a three electrode electron gun without mesh grid. Construction and design of the gun is described in [1] and [2]. The influence of the electric and mechanical electron gun parameters on the properties of the nanosecond linear LAE10 accelerator was in-
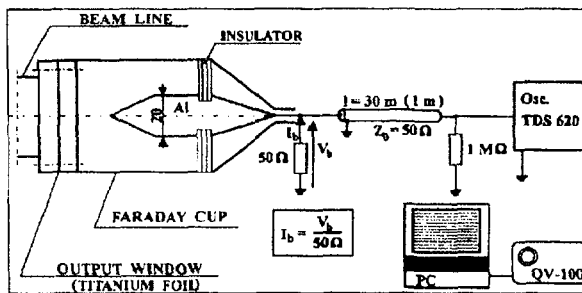

Fig.1.

vestigated. The shape of the electron pulses was investigated, in particular.

Electron pulse profiles registration circuit diagram is presented in Fig.1. The current of the accelerator electron beam was collected by a specially designed Faraday's cup. The pulse shape was measured using a TDS620 Tektronix digital oscilloscope. A Casio QV-100 digital camera was used to record the oscillograms.
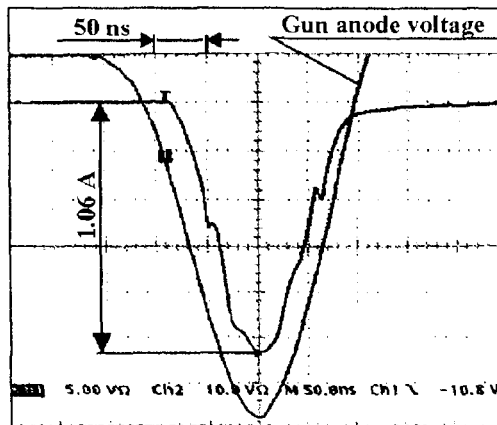
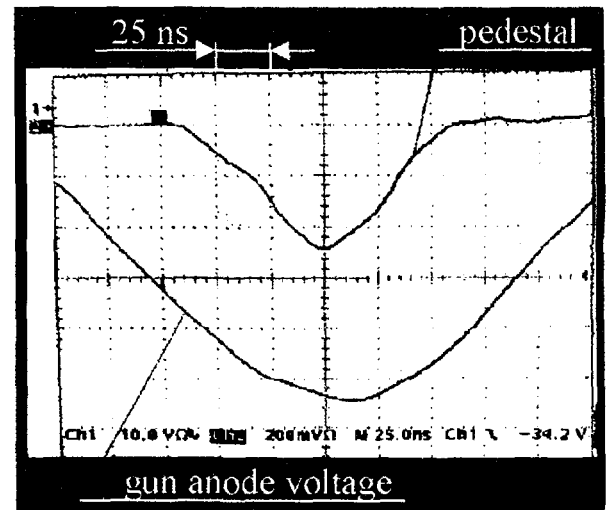Fig.2 shows shapes of the electron beam pulses provided by the LAE10 accelerator. The first pulse

Fig.3.

has a duration of about 100 ns and the second one - about 8 ns. We can distinguish two parts (the pedestal and main nanosecond pulse) in the second oscillogram. The shape of the pedestal is shown distinctly in Fig.3 (this oscillogram was obtained

Fig.2.