We are developing the mathematical bases and programs for identification the gamma spectra of compound samples (especially measuring in scintillations gamma spectrometer) for their analysis. For that, as bases, we use known methods of identification compound gamma spectra by reference spectra, by monochromatic gamma radiation and the Shannon theorem based on methods [1] and others.

Basic integral equation of recovery the spectra we representing in discrete sum form, i.e.

$$y(x) = \int_0^{E_{max}} S(E,x)T(E)dE \Rightarrow y_i = \sum_j S_{ij}T_j , \qquad (1)$$

where y_i is the measurement of $y(x)$ in channel of pulse height I, T_j is the total number of gamma rays in energy group ΔE_j and S_{ij} is the value of the j^{th} standard spectrum channel i. We represent equation (1) in the matrix form

$$ST = Y, \qquad (2)$$

and the solution of this system we find by using following orthogonal decompositions:

$$CZ = F, \qquad (3)$$

where $C = PSQ$, $F = PY$, C is bi-diagonal matrix, P and Q are orthogonal matrices of rotation or reflection. Then we solve the system (3) with bi-diagonal matrix and find $T = QZ$.

Setting orthogonal transforms are stability for computation errors [2] and we can find the solution of the system (2) maximal exactly.

In this paper we set the examples of using developing methods for identification the spectra of model samples that show applicability of developing methods for analyze of neutron capture gamma radiation.

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ABOUT POSSSIBILITIES OF OBTAINING FOCUSED BEAMS OF THERMAL NEUTRONS OF RADIONUCLIDE SOURCE

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In the last years significant progress is achieved in development of neutron focusing methods (concentrating neutrons in a given direction and a small area). In this, main attention is given to focusing of neutron beams of reactor, particularly cold neutrons and their applications. [1,2]. However, isotope sources also let obtain intensive neutron beams and solve quite important (tasks) problems (e.g. neutron capture therapy for malignant tumors) [3], and an actual problems is focusing of neutrons.

We developed a device on the basis of californium source of neutrons, allowing to obtain focused (preliminarily) beam of thermal neutrons with the aid of respective choice of moderators, reflectors and geometry of their disposition. Here, fast neutrons and gamma rays in the beam are minimized.

With the aid of the model we developed on the basis of Monte-Carlo method, it is possible to modify aforementioned device and dynamics of output neutrons in wide energy range and analyze ways of optimization of neutron beams of isotope sources with different neutron outputs. Device of preliminary focusing of thermal neutrons can serve as a basis for further focus of neutrons using micro- and nano-capillar systems. It is known that, capillary systems performed with certain technology can form beam of thermal neutrons increasing its density by more than two orders of magnitude and effectively divert beams up to 20° with length of system 15 cm.

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PROTON ACTIVATION ANALYSIS OF SOME CHEMICAL ELEMENTS ON A NUCLEAR REACTOR

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We investigated the yields of radio-nuclides produced by secondary nuclear reactions with recoil protons on ^{18}O, S, Ti and V. Nuclear data for these radio-nuclides are listed in the table.

Chemical elements	Radio-nuclides	$T_{1/2}$	E_γ, keV; (I_γ,%);
O	^{18}F	1.83 h	511 (1993,4)
S	^{34m}Cl	31.99 m	3305 (11,6), 2928(48,4), 1174<4 (14,1), 640 (0,48) 511(120) , 145,7 (35,8)
Ti	^{48}V	16.18 d	2421.75-3), 2375,6 (0,010), 2240 (2,4), 1312 998), 983,3 ((100), 944,3 ((8), 511 (99,6)^
V	^{51}Cr	27.8 d	320 (9,63)