ABOUT MODELING OF $^{nat}U + Th$ NEUTRON SOURCE ON THE BASIS OF D + T NEUTRON GENERATOR

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The experimental research of various aspects of ADS on the basis of low energy accelerators – cyclotrons, microtrons, as well as deuterium or tritium ions accelerators – neutron generators of high intensity is of great importance. Such experimental studies must precede the calculations of neutron spectra with application of MCNP [1] and GEANT4 [2] codes. In given work the calculation results on modeling of the neutron source on the basis of D + T neutron generator are presented. With application of GEANT 4 code the preliminary model calculations are executed with use of experimental information on energy dependence and angular distribution of secondary neutrons from mixtures of fission materials. IonPhysicsPHP and NeutronHP models were used in calculation. The results normalized on one deuteron with energy 105 keV hitted the $TiT_{1.5}$ neutron target. The simulated angular distribution of neutrons yield from the neutron target shows that neutrons are emitted from the target isotropic. The neutron flux values on distance of 10 cm from center of the neutron target as well as at the studied sample and detector positions were calculated.

The dependences on scattering angle of integral fluence of secondary neutrons normalized to one incident neutron at irradiation of thin ^{232}Th and $^{232}Th + ^{233}U$ (50/50%), and thick $^{232}Th + ^{233}U$ samples were calculated. Also the dependence of such fluence on the thickness of $^{232}Th + ^{nat}U$ (50/50%) mixture sample is investigated. From Fig.1 it is clear that maximal yield of secondary neutrons is reached at 15 cm radius of such metallic sample. So we can conclude that central part of the high intensive neutron source intended for applied studies and constructed as the $^{232}Th + ^{nat}U$ (50/50%) core irradiated by neutron flux of D + T neutron generator, must have a form of the sphere with radius 15 cm.

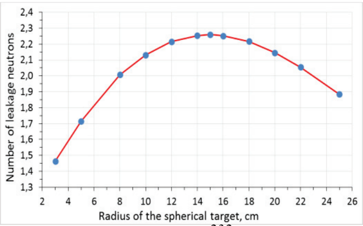

Fig. 1. The dependence of full fluence from $^{232}Th + ^{nat}U$ (50/50%) target thickness.

1. J.F.Breismeister // ed. LA-13709-M. Los Alamos National Laboratory. 2000.
2. J.Apostolakis *et al.* // Radiation Physics and Chemistry. 2009. V.78. P.859.