THE Registration of DD-NEUTRONS FROM A PLASMA FOCUS BY SCINTILLATION DETECTORS IN CONFINED SPACE – EXPERIMENT SIMULATION [[1]](#footnote-1)\*)

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When preparing an experiment with a plasma-focus neutron source powered by an explosive magnetic generator, the laboratory testing of the stable operation of a plasma-focus discharge chamber (PF) is realized at the initial stage.

The results of one of the research stages are described in [1]. Later, similar experiments with the use of the same facility were carried out with the scintillation detectors (SD) placed at a distance of 6 m and 9 m from the PF. The measurements were performed in an experimental room with dimensions of 18m x 12m and 7.5 m high. The radiation source was located ~2m above the floor. The minimum distance to the nearest wall was 4.5 m, to the concrete ceiling ~5.5 m. The direction from the source to the detectors was ~ 80o to the camera axis.

The results of measurement of radiation from PF chambers by scintillation detectors using the time-of-flight method are compared with the results of calculations of a similar dependence using the Monte Carlo method, the features of detector signal generation in a closed space of the experimental room are considered.

To explain the features observed in experimental waveforms, a hypothesis about the effect of anisotropy of the neutron yield from the source on the SD signal shape was proposed. To substantiate this assumption, model calculations were performed using the C-007 method [2], in which the angular distribution of the neutron source was set to be: a) isotropic and b) directed along the camera axis (extreme anisotropy). For a more visual interpretation of the calculations, the neutron source was considered to be instantaneous. Both the general outline and the time position of the characteristic peaks on the experimental waveforms generally agree with the calculations and confirm the hypothesis of a noticeable influence of scattered radiation together with the anisotropy of the neutron flux from the source on the formation of the detector signal.

The results of the calculations can be used to analyze the performed experiments and to assess the presence of anisotropy of the neutron yield in a particular discharge.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/Lt/ru/ET-Ablesimov.docx) [↑](#footnote-ref-1)