MEASUREMENT OF COLD NEUTRON FLUX IN HETEROGENEOUS PLASMA AND NUMERICAL SIMULATION ON INTERACTION OF THIS FLUX WITH HETEROGENEOUS PARTICLES [[1]](#footnote-1)\*)

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1Belov N., 2Evstigneev N., 1Klimov A., 2Ryabkov O.

1Joint Institute for High Temperature RAS, Moscow, Russia, [klimov.anatoly@gmail.com](mailto:klimov.anatoly@gmail.com)  
2Moscow State Lomonosov University, NMK, Moscow, Russia, [evstigneevnm@yandex.ru](mailto:evstigneevnm@yandex.ru)

There is considerable interest to study of nano-cluster - hydrogen atoms (ion) interaction in a heterogeneous plasma (HP), [1, 2]. Measurement of cold neutron flux in HP created in a plasma vortex reactor (PVR) in testing heterogeneous mixture by combined electrical discharge is considered in this work. The experimental setup PVR was considered in our work [3]. Electrical discharge parameters were the followings: - pulsed electric current 10 Amp, Pulsed voltage 1÷4 kV, pulse duration -10÷20 mcs, power pulse frequency – 10÷40 kHz. Water steam mass flow rate -1÷4 G/s, mass flow rate of erosive cathode electrode - 1 mG/s, static gas pressure -1 Bar. The optical and X-ray radiation spectra were obtained in HP. Hydrogen concentration was measured by gas analyzer. Main parameters and characteristics of the HP were obtained by processing of these spectra. The HP were the followings: - electron concentration Ne= 1014÷1015 cm-3, electron temperature Te= 1÷2 eV, gas temperature Tg= 2000÷4000 К. Dissociation level of water steam is about of ~10-3. Cold neutron flux was measured by radiometer ORIN (Italy) with He3 detector and radiometer КРАН-1. These radiometers were calibrated by standard radioactive neutron source with definite radiation doze (JINR, Dubna). It was revealed that there was non-stationary and anisotropic distribution of neutron radiation in HP. The intensity of this radiation was about of ~107/с-1. The decay time of this radiation was 5÷30 min after power supply off. It was realized a numerical simulation of the interaction of cold neutron flux with heterogeneous particles for explanation of chemical element transmutation obtained in these experiments. It was supposed that there is neutron flux creation in the small hot spots on electrode surface and erosive micro metal droplet surface. Neutron flux density was about of in these hot spots. It was obtained a good agreement between experimental and theoretical results.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/Cm/ru/KH-Klimov.docx) [↑](#footnote-ref-1)