



Contribution ID: 555

Type: **not specified**

P4.220 Measurement of Neutron Spectrum using Activation Method in Deuterium Plasma Experiment at LHD

Thursday, 20 September 2018 11:00 (2 hours)

In Large Helical Device (LHD) at National Institute for Fusion Science, deuterium plasma experiment with $d(d, n)^3\text{He}$ reaction was performed from March to July 2017. The neutron generated in plasma is a direct evidence of this reaction. In addition, the neutron spectrum measurement will be useful in fusion engineering to be able to estimate the activation quantity of the fusion reactor devices. In this study, we performed the activation experiments using multiple activation foils to obtain a neutron spectrum in the vacuum vessel of LHD.

We employed materials such as indium and silicon, which can be radioactivated above threshold energy in this experiment. Therefore, we are able to estimate not only the contribution of 2.45 MeV neutrons generated from $d(d, n)^3\text{He}$ reactions, but also that of 14 MeV neutrons generated from concomitant $t(d, n)^4\text{He}$ reactions. Some activation foils were sealed in a polyethylene capsule and were transported to the vicinity of the outermost magnetic flux surface of the plasma in the vacuum vessel by the pneumatic tube. After the foils were activated, we measured gamma-rays from the targeted reaction by the HPGe detector and calculated the reaction rate from the obtained just pulse counts. The reaction rate of each activation foil was generally consistent with the calculation result by MCNP6. As a result of the unfolding with SAND-II code, we obtained a neutron spectrum in the vacuum vessel of LHD for the first time. Because the accuracy of the low energy region of the spectrum is not good, the improvement of the response function is necessary to confirm the actual spectrum.

Presenter: TANAKA, Tomoyo (Graduate school of engineering Nagoya University)

Session Classification: P4