

Calibration strategy of the ITER Vertical Neutron Camera

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ITER Vertical Neutron Camera (VNC) is a multichannel neutron collimator system designed for measurements of neutron and alpha source profile. VNC uses CVD diamond detectors and ^{238}U Fission Chambers as neutron detectors. The characterisation of the detectors is necessary to determine their response functions in the neutron energy range that diagnostic is expected to measure. Characterisation plan of VNC detectors at neutron laboratory using DD and DT neutron generators is described here.

Analysis of neutron transport performed for VNC has shown that there is a significant amount of scattered neutrons in the most diagnostic channels. Approach with DD and DT neutron contribution matrix is proposed to consider the impact of background neutrons and to calculate the profile¹. In this work, we also present the capability of VNC system to reconstruct of neutron emission profile and estimate sensitivity to the statistical errors of measurements, errors of magnetic surface shapes and errors of contribution matrix. Latter systematical error can be partially corrected during in-vessel calibration with the known neutron source. Based on such analysis we propose calibration strategy for VNC system.

¹R. Rodionov, D. Kumpilov, G. Nemtcev, L. Bertalot, J. Vysokih, Calculation of DD and DT neutron contribution matrix for ITER vertical neutron camera detectors, Fusion Eng. Des. 173 (2021) 112874, <http://dx.doi.org/10.1016/J.FUSENGDES.2021.112874>