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#03-162 Data acquisition system prototype of the ITER diagnostic Divertor Neutron Flux Monitor testing at research nuclear facilities

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The Divertor Neutron Flux Monitor is the one of the neutron diagnostics of the International Thermonuclear Experimental Reactor ITER. This diagnostic consists of three subsystems. Each subsystem consists of the detector module includes six fission chambers and the data acquisition system. Detector modules are placed on the inner shell of ITER Vacuum Vessel under the Divertor Cassette. Expected neutron flux at the Divertor Neutron Flux Monitor detector modules position is from 1E3 to 1E13 n sm-2 s-1. The multidetector module is used to solve the task of the neutron flux measurements at ten orders of magnitude with 1 ms of time resolution. Divertor Neutron Flux Monitor module consists of two detector units. The first detector unit concludes three-section fission chamber with 235U as the fissile material and the second concludes three-section fission chambers with 238U. To demonstrate the possibility of the neutron flux measuring in a wide dynamic range using such a detector module and to evaluate the characteristics of the data acquisition system prototype a number of tests were carried out under conditions of the intense neutron radiation. Detector units, which are similar to those planned for use on the ITER, and the mobile version of the prototype were used for the tests. The tests were carried out at the plasma neutron diagnostic stand based on the NG-24M neutron generator with yield of 1E11 n s-1, and at the IBR-2 pulsed reactor of the Joint Institute for Nuclear Research with neutron flux of 1E9 - 1E12 n cm-2 s-1 depends on monitor position at peak power 1.6-1.85 MW. During tests at the plasma neutron diagnostic stand the mobile version of the data acquisition system prototype functionality was checked. The averaged pulse shapes and pulse-height spectra of all fission chambers were recorded. The data for the calibration of the data acquisition and processing system measuring channels were obtained. During the tests at the IBR-2 pulsed reactor the signals from the measuring channels of the subsystem were recorded while the neutron flux was changed. This paper shows the test results and discusses techniques and methods of the DNFM neutron diagnostic subsystem calibration.

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