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# MODELING AND ANALYSIS OF THE RESPONSE OF ORGANIC SCINTILLATORS FOR THE PURPOSES OF NEUTRON DIAGNOSTICS ON EAST AND ITER TOKAMAKS *)

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Detectors based on organic scintillators are successfully used for registration the fast neutron flux due to their high sensitivity (about $cm^2$) to high-energy neutrons in the range [1, 20] MeV. The paper presents the measurement results for detectors installed in the Radial Neutron Camera (RNC) for the tokamak EAST. The RNC includes 6 observation lines with different viewing angles in the plane of the poloidal section for the plasma cord. At the end of each observation line there is a xylene-based BC501A [1] detector.

The accompanying simulation of the detector response was performed using the GEANT4 Monte-Carlo simulation package [2]. The group spectrum of the neutron flux for each observation line was used as the input data of the calculation, and the simulation results were compared with the data obtained by RNC detectors during several discharges of the EAST tokamak. The simulation results are in good agreement with the results of measurements during discharge, which confirms the correctness of the developed model to the response of an organic scintillator, and also allows it to be used in model tasks for neutron diagnostics on the ITER tokamak.

An analysis of the operation of similar neutron spectrometers from the diagnostic complex has done for the Neutral Particle Analyzer [3] ITER. This diagnostic includes a detector based on an organic stilbene crystal. The detector response was simulated for various group neutron spectra corresponding to several key scenarios of ITER tokamak discharges. The simulation results made possible to optimize the crystal size, taking into account the possibility of operation of such a detector in both deuterium and some deuterium-tritium scenarios with reduced neutron yield. For the obtained detector response to neutrons, the error in determining the density of the direct neutron flux, as well as the temperature of ions in the center of the plasma cord, was estimated for some scenarios with tritium. The results of calculations of neutron transport take into account the most relevant model of the diagnostic complex in equatorial port N. 11, which underwent significant changes during the preparation for the protection of the final diagnostic project.

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