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## DEVELOPMENT OF AN ALGORITHM FOR DETERMINING THE PLASMA POSITION IN THE T-15MD TOKAMAK BASED ON SYNTHETIC DIAGNOSTICS \*)

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Real-time control of the plasma cord vertical and major radius position is an important task for the successful conduct of the experiment, and in particular it is a necessary part of the feedback plasma position control system.

In the control, either simplified algorithms based on direct measurements (usually of either magnetic flux or magnetic field) or real-time plasma boundary reconstruction codes such as P-EFIT [1] are used.

The advantages of the simplified algorithms, in addition to simplicity of implementation, include the possibility of operation at sufficiently small plasma currents, while the operation of recovery codes is challenging at currents less than 50 kA (on the scale of the T-15MD tokamak).

In this paper we consider the implementation of two simplified methods of plasma center position control based on direct measurements by the electromagnetic system of the tokamak T-15MD:

- A method based on the variation of the magnetic flux measured by magnetic loops (DNO - bypass voltage sensors) [2]

- A method based on changes in the magnetic field measured by magnetic field sensors (DFs - shape sensors) [3]

The proposed algorithms include experimentally measured values with coefficients which were determined as a result of the optimization procedure. For this purpose, synthetic pulses simulating evolution of plasma equilibrium of the T-15MD unit were created using the DINA code [4]. Further, the functional representing the difference between the plasma cord center position determined by the selected algorithm and the position obtained from the synthetic pulse using the method [5] was minimized, as a result of which the necessary coefficients included in the used formulas were determined.

The paper compares the results of determining the plasma position using the proposed algorithms with the results of the plasma boundary reconstruction code D\_Bound [6] for both synthetic pulses and the real pulse in the tokamak T-15MD.

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