

Data validation of magnetic diagnostic at Tore Supra

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The main mission of Tore Supra in the frame of the European fusion program is the study of high performance discharges over long duration. To reach these objectives, an accurate real time shape and position control of the plasma is a priority. The magnetic diagnostic is a suitable device that provide the main electromagnetic parameters of plasmas (I_p , V_{loop}); the plasma boundary shape and position; and also key internal parameters (β , l_i , W_{dia}). These data are relevant as long as the sensor information is reliable. Therefore, some tools must be implemented to validate the accuracy of the input data.

On Tore Supra, the magnetic data validation is made at different levels of the calculation. In the real time program calculation, the coherence of the input data is checked at any time using several checkpoints. If too many data are found to be doubtful, the plasma discharge can be stopped. After each shot a matlab® program processes the row data using a different way for the analysis. This program is able to check itself the validity of the data and a cross-control is performed with the real-time data. Errors and warning are generated if internal incoherencies are found or if plasma parameters are too different. Finally a more universal approach consists in calculating global plasma parameters using the TPROF code. This calculation is made using the computed data from the whole Tore Supra diagnostics. The data self-consistency between the diagnostics can be demonstrated with such a tool.

After a brief description of the magnetic diagnostic, we present the inner data control principles that are implemented in the real time calculation and in the row data computing code. We discuss also about the cross control between these two programs. Then we present an example of cross control using the global approach.