

GYROTRON POWER BALANCE BASED ON CALORIMETRIC MEASUREMENTS IN THE DIII-D ECH SYSTEM*

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The primary purpose of the gyrotron calorimetric system on DIII-D is to estimate the rf power radiated into the tokamak vacuum vessel. This requires measurement of the power loading of the gyrotron output window and the rf beam handling and coupling components. Coincidentally with the measurement of rf beam losses outside the gyrotron, calorimetry of the gyrotron internal cooling circuits allows the measurement of power loading inside the gyrotron. This permits a detailed observation of the total power balance during gyrotron operation to be performed. The power calculations are made automatically using temperature difference and flow measurements on the gyrotron cooling circuits. A computer, triggered by sensing the gyrotron pulse, acquires calorimetric signals from each cooling circuit and calculates the dissipated energy with a *LabVIEW* program. Power balance measurements have been made for each of the six gyrotrons in the DIII-D system to diagnose the gyrotron tuning and losses. These results were archived so that system performance can be monitored during experiments and then analyzed more exhaustively at a later time. The system will be described and the results of the measurements will be presented.

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