

Abstract Submitted for the 56th Annual Meeting
Division of Plasma Physics
October 27–31, 2014
New Orleans, Louisiana

Category Number and Subject:

[] Theory [X] Experiment

Analysis and Alignment of a Gyrotron RF Beam on the DIII-D ECH System,* Y.A. Gorelov, J. Lohr, A. Torrezan, J.P. Anderson, D. Ponce, M. Cengher, *General Atomics* – The DIII-D ECH transmission line installation comprises seven runs of up to 80 meters of 31.75 mm diameter waveguide, with transmission efficiencies from 69%–79%. The efficiency depends on the purity of the $HE_{1,1}$ mode in the waveguide. The Gaussian rf beam from a gyrotron is converted to the $HE_{1,1}$ waveguide mode with a single focusing mirror in the matching optics unit (MOU) that places a waist, $w_0=19$ mm, at the input of the waveguide. At tilt angles Θ of less than two degrees and small offsets Δ of less than 3 mm, the mode conversion from a pure $HE_{1,1}$ mode increases as Θ^2 and Δ^2 respectively. The rf beam from the newest gyrotron was recorded in free space propagation at 10 cm intervals from the gyrotron window using an infrared camera. These data were used for phase retrieval calculations to optimize the design of the focusing mirror in the MOU. The mirror position was then set to align the rf beam with the waveguide axis. The measurement was repeated for the rf beam radiated from a short length of waveguide and the $HE_{1,1}$ content was 87%. This is slightly low compared to the measurements of the other waveguides.

*Work supported by the US DOE under DE-FC02-04ER54698.