

Abstract Submitted  
for the DPP07 Meeting of  
The American Physical Society

**170 GHz ITER ECH Transmission Line Estimated Losses and Testing** M.A. SHAPIRO, S.T. HAN, J.R. SIRIGIRI, D. TAX, R.J. TEMKIN, P.P. WOSKOV, MIT PSFC, T.S. BIGELOW, D.A. RASMUSSEN, ORNL — The US will build 24 Transmission Lines (TL) connecting the 170 GHz gyrotrons to the ITER tokamak. Losses in the 63.5 mm diameter corrugated waveguide are estimated using an approximate analytical theory as 11% for a TL length of about 100 m. Experimental demonstration of such low loss transmission is a challenge. The results of estimation can be verified through precise measurements and advanced simulations. A set of 170 GHz corrugated waveguide TL components built by General Atomics is under test at MIT. High precision measurement techniques include a vector network analyzer and a radiometer. The miter bends are tested as critical TL components, since they are responsible for the largest amount of mode conversion and loss. The testing results are compared with advanced simulations using the HFSS code (Ansoft Corp.). Another critical issue is additional loss due to thermal or mechanical distortion of the miter bend mirror and the waveguide sections during 1 MW CW power transmission. The critical issues have been revealed in high power CW test of the 170 GHz TL using the 1 MW 170 GHz gyrotron at JAEA, Japan. The US is planning a high power test stand for testing the ITER TL. Advanced thermo-mechanical simulations and HFSS electromagnetic simulations will be conducted to explain the experimental results.

M.A. Shapiro  
MIT PSFC

Date submitted: 21 Jul 2007

Electronic form version 1.4