

Abstract Submitted
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Measurement of 170 GHz Corrugated Waveguide Transmission Line and Components for ITER ECRH¹ D.S. TAX, E.N. COMFOLTEY, S.T. HAN, M.A. SHAPIRO, J.R. SIRIGIRI, R.J. TEMKIN, P.P. WOSKOV, MIT Plasma Science and Fusion Center, T.S. BIGELOW, D.A. RASMUSSEN, Oak Ridge National Laboratory — The US will build 24 Transmission Lines (TL) connecting the 170 GHz gyrotrons to the ITER tokamak. A set of 170 GHz corrugated waveguide TL components built by General Atomics is under test at MIT. As critical TL components the miter bends were tested, as they are responsible for the largest mode conversion and loss. A loss of 0.05 ± 0.02 dB per miter bend has been measured using a vector network analyzer. Mode content has been measured in the HE_{11} mode cold-test launcher and after the miter bend. These measurements have motivated revisiting the theoretical mode conversion losses in ITER TLs. It is shown that the mode conversion loss of the power in an HE_{11} mode at a miter bend is greatly altered by the presence of even a small proportion of higher order modes (HOMs) in the TL, and is a strong function of HOM's magnitude and phase relative to the HE_{11} mode. The resulting total loss in the ITER TLs is expected to be very different from the loss previously predicted using single mode theory.

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