

Abstract Submitted
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Loss Estimate for ITER ECH Transmission Line¹ M.A. SHAPIRO, E.J. KOWALSKI, J.R. SIRIGIRI, D.S. TAX, R.J. TEMKIN, MIT PSFC, T.S. BIGELOW, D.A. RASMUSSEN, US ITER Project, ORNL — The ITER ECH Transmission Lines (TL) are 63.5 mm diameter corrugated waveguides that will each carry 1 MW of power at 170 GHz. The current specifications require that the transmission efficiency of the HE₁₁ mode from the gyrotron to the plasma should exceed 83%. The transmission losses on the ITER TL have been calculated for four possible cases corresponding to having HE₁₁ mode purity at the input of the TL of 100%, 97%, 90% and 80%. The losses due to coupling, Ohmic and mode conversion loss are evaluated. Estimates of the calorimetric loss on the line show that the output power is reduced by about 5 ± 1 % due to Ohmic loss in each of the four cases. Estimates of the mode conversion loss show that the fraction of output power in the HE₁₁ mode is about 3% smaller than the fraction of input power in the HE₁₁ mode. High output mode purity therefore can only be achieved with significantly higher input mode purity. We also present a new conservation theorem relating the field distribution offset and propagation angle due to any two linearly polarized LP_{mn} modes propagating in the corrugated waveguide.

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