Mode Conversion Losses in a Smooth Wall Circular Waveguide

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Abstract

The ITER-ECE transmission lines consist of smooth-wall circular including miter bends & other waveguide components for transporting the mm waves from TOKAMAK to diagnostic building. The performance of the TL is crucial to ensure that the requirements for the diagnostic to measure the plasma parameters are met. COMSOL Multiphysics® is a finite element method code with a built-in Eigen mode matrix solver. This means that the code can solve for the structure's mode and then return results in a scattering matrix that outlines transmission, reflection, & mode conversion coefficients, which is particularly useful for the study of waveguide. The accuracy of COMSOL solutions depends on the size of the free triangular mesh size with respect to wavelength at the frequency being solved for. In this paper, we launched TE01 mode which is low attenuated mode in smooth wall circular waveguide & validate the transmission of TE01 results with the analytical results. The details of the model, numerical approach and analysis results will be presented in this paper.

Reference

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4. D. S. Tax, E. N. Comfoltey, S. T. Han; M. A. Shapiro, J. R. Sirigiri, R. J. Temkin, P. P. Woskov, "Mode conversion losses in ITER transmission lines," Proc. of 33rd Intl. Conf. IR, MM and THz Waves, Sept. 2008
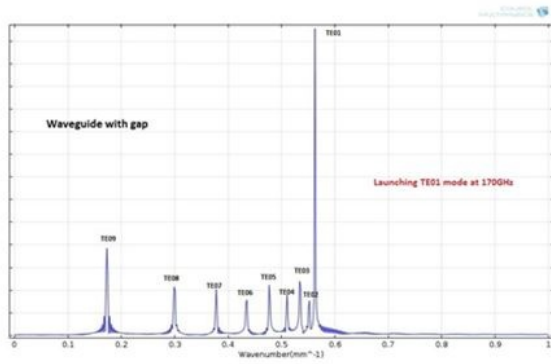5. RF Module of COMSOL MULTYPHYSICS 4.2a

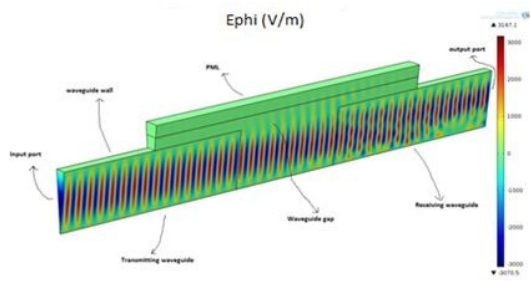# Figures used in the abstract

Figure 1

Figure 2