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Modeling ITER ECH Waveguide Performance M.C. KAUFMAN, C.H. LAU, Oak Ridge National Laboratory — There are stringent requirements for mode purity and for on-target power as a percentage of source power for the ECH transmission lines on ITER. The design goal is less than 10% total power loss through the line and 95% HE_{11} mode at the diamond window. The dominant loss mechanism is mode conversion (MC) into higher order modes, and to maintain mode purity, these losses must be minimized. Miter bends and waveguide curvature are major sources of mode conversion. This work uses a code which calculates the mode conversion and attenuation of an arbitrary set of polarized waveguide modes in circular corrugated waveguide with non-zero axial curvature and miter bends. The transmission line is modeled as a structural beam with deformations due to misalignment of waveguide supports, tilts at the interfaces between waveguide sections, gravitational loading, and the extrusion and fabrication process. As these sources of curvature are statistical in nature, the resulting MC losses are found via Monte Carlo modeling. The results of this analysis will provide design guidance for waveguide support span lengths, requirements for minimum alignment offsets, and requirements for waveguide fabrication and quality control.

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