BENDS IN OVERSIZED RECTANGULAR WAVEGUIDE FOR THE ITER RELEVANT LHCD SYSTEM

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The use of rectangular oversized waveguides in the Main Transmission Lines (MTLs) of the Lower Hybrid Current Drive (LHCD) system of ITER, requires to investigate the problem of bends. The high number of involved waveguides (from 24 to 48) must be also taken into account. Thus, it has to consider not only the best choice in terms of curved framework, but also the proper allocation of all the waveguides. In this context, the principal specifications that characterize the design of the bends are: a) to minimize the reflection of the fundamental TE_{10} mode; b) to maximize the transmission of the fundamental TE_{10} mode; c) to minimize the coupling between the TE_{10} mode and other spurious modes that propagate at 5 GHz.

This paper presents an overview about the bend options, and it compares the performances of several frameworks analyzed by using the Finite Element Method (FEM) commercial software, HFSS®.

First of all, simple circular trajectory curves with different angulations, are considered. Then, the so called Mitre Bends alternatives are deeply analyzed. These curves are studied by several authors in the mono-modal configuration [1, 2], with different techniques but the propagation in an oversized environment is a topic not much attended in literature.

The only design parameter of the simple circular trajectory bend is the bending radius, so that the design is not flexible; the Mitre Bend structure is at least more flexible than the previous one and it is of great interest to study this type of bend to check the possible advantages.

Finally an innovative modified Mitre Bend solution based on a cascade of trapezoidal elements is proposed.

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