



Dual-Mode Circular Horn Simulation with the MLFMM

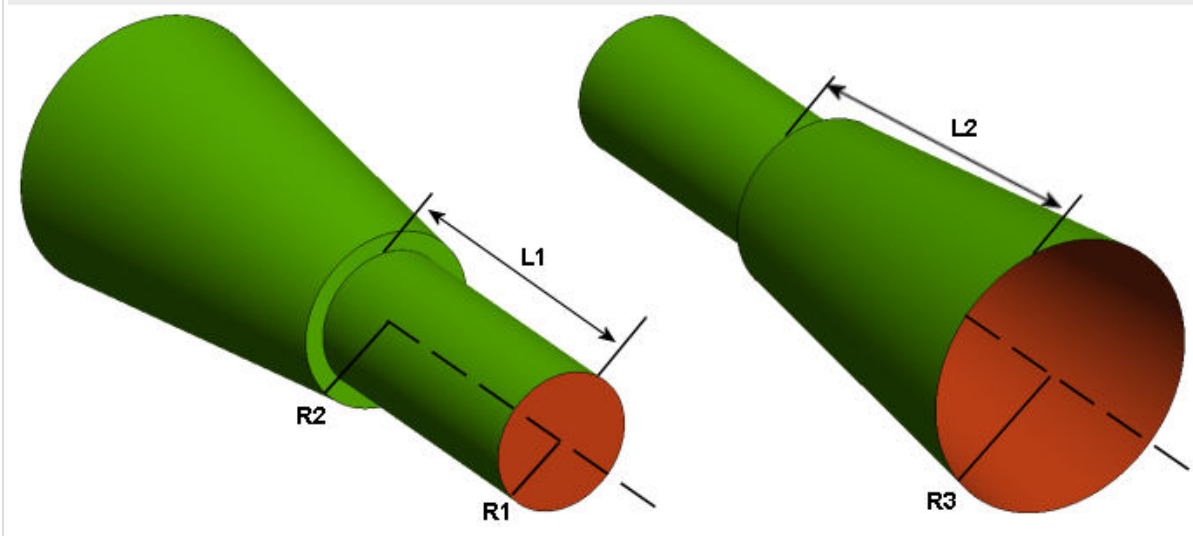
A dual-mode circular horn antenna is simulated with the MLFMM and far-fields are extracted. Skobelev *et al.* [1] described how a dual-mode horn antenna may be manufactured cost effectively with simple modifications to the geometry of the antenna. This page describes the simulation of a standard dual-mode horn antenna with dimensions comparable to the antennas proposed by Skobelev *et al.* The simulation is constructed at a 12.5 GHz centre frequency and was simulated using FEKO's Multilevel Fast Multipole Method (MLFMM) implementation.

Geometry

The dual-mode antenna simulated in this simulation has the following dimension, illustrated in Figure 1:

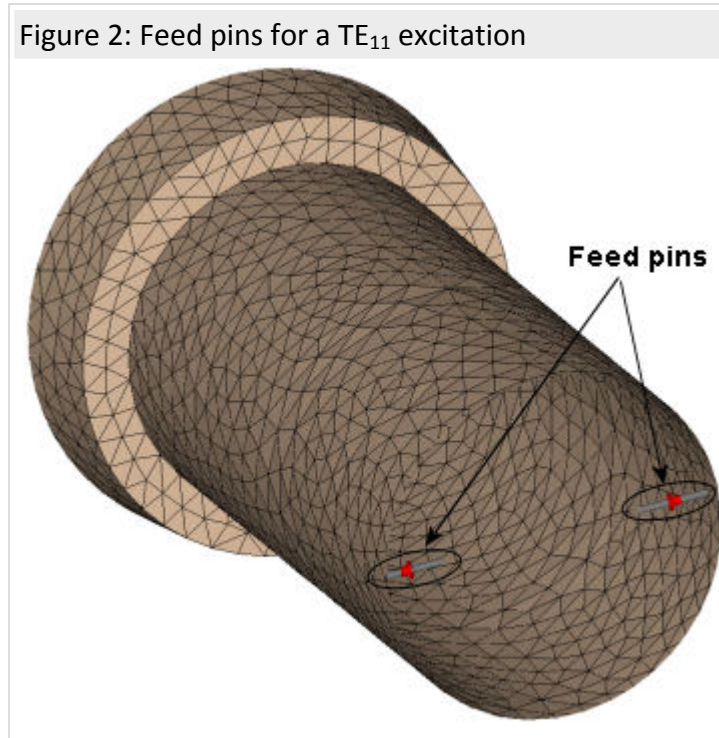
- Waveguide radius = $0.51 \lambda_0$
- Waveguide length = $2 \lambda_g$
- Transition radius = $0.65 \lambda_0$
- Flare radius = 1λ
- Flare length = 3.05λ

Figure 1: Dual-mode antenna geometry



Feed mechanism

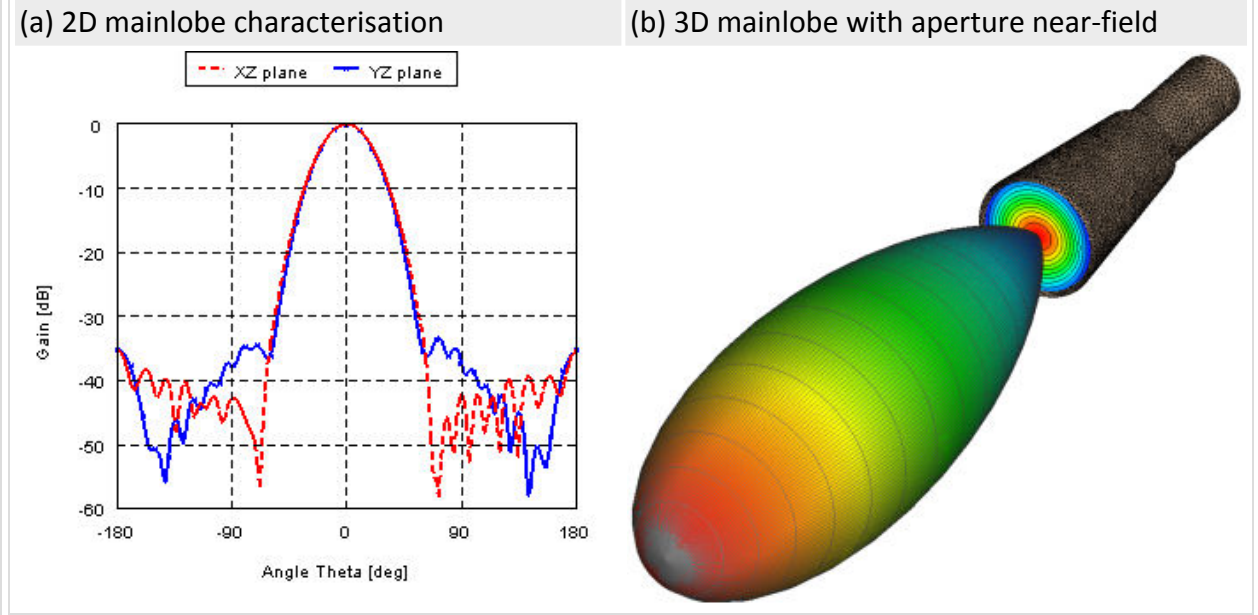
A TE_{11} mode is excited with a pin-feed configuration as depicted in Figure 2. The pins are located 10mm from the end of the guide and are 5mm long.



Results

Figure 3 presents the results from the MLFMM simulation of the far-field patterns of the horn antenna. Both the maximum gain and the -3dB main lobe width compares well with the values predicted in [1].

Figure 3: Far-field radiation patterns



References

- [1] S.P. Skobelev, B.-J. Ku, A.V. Shishlov, and D.-S. Ahn, "Optimal Geometry and Performance of a Dual-Mode Horn Modification," IEEE Antennas and Propagation Magazine, Vol. 43, No. 1, February 2001



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