CHAPTER 6

FEED LINE BASIC

Shall I refuse my dinner because I do not fully understand the process of digestion?

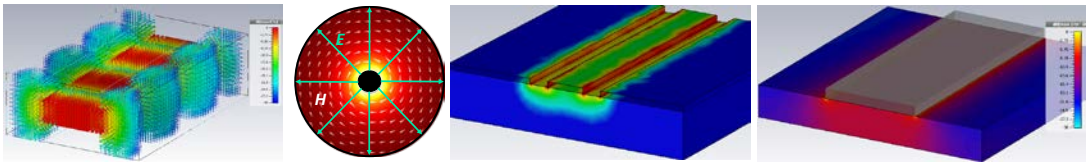
Oliver Heaviside

You can learn in Chapter 6

This chapter is dedicated to the theory and applications of a wide range of feeds aka transmission lines. Following to the engineering approach, we started our deliberation from essential feed line characteristics such as line impedance, cutoff frequency, power handling, and attenuation. Not to go too far away from well-known circuit theory, we built the physically sound model of the arbitrary transmission line based straightly on Poynting's theorem. Following this path, you can understand the controversy connected to unambiguous definitions of line impedance and methods to go around.

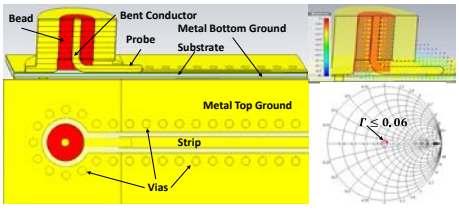
Meanwhile, feed diversity is so broad that we were forced to severely limit the number of them to be considered in details. We cautiously divided all known feeds into two categories, open and close ones, to give you a sense of theme because sometimes the feeds design is complicated by the requirement that they should not radiate or intercept energy theirself. Multiple illustrations and several tables will help you get used to the fact that every line has its pros and cons and none is the best for all applications. Fiber optic lines including optical waveguides belong to open feeds. Nevertheless, they were put into separate section due to their significance for modern communication systems.

The rest of the chapter introduces you to the engineering world of concrete feeds as two-wire and



coaxial lines, metal waveguides, strip and microstrip family, slot and coplanar waveguides. Multiple EM field structures demonstrate in color EM energy and field distributions in lines that should help you understand and solve numerous problems using such "insight" knowledge. Several images are shown here.

Notably, this information is critical for design, test, and development of feed transitions between coaxial lines, coax-waveguide adapters, different kind of coax-stripline adapters, and rotary joins. Numerous equivalent circuits and EM-field structures will help you to grasp the main idea of all transitions: how to transform the field patterns to get a broadband interconnections. The section is richly illustrated with multiple color drawings and images like shown on your left.



The final section of this chapter is devoted to feeding lines loaded with magnetized ferrite. You will become familiar with the most important physical phenomenon of EM wave interaction with processing spins and some simplest ferrite devices as Faraday isolators, reciprocal and non-reciprocal phase shifters, resonance isolators, and isolators based on field displacement effect, Y-circulators.

Chapter Content