Simulations and Measurement of Lateral Waves on a Grounded Magneto-Dielectric Slab

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This presentation gives an in-depth analysis of the simulated performance of lateral waves as excited by a Hertzian dipole located at the air/dielectric interface of a grounded magneto-dielectric slab. It is well known that the analytical formulation that accounts for lateral waves is related to the circling of poles in the complex plane. This presumes the magneto dielectric is homogeneous. The situation becomes considerably more complex when the material is anisotropic and analytic results are not always tractable. Although, this configuration is more complex, an artifact of the anisotropy is increased control over the direction taken by the lateral waves. By properly prescribing the anisotropic parameters, control of the fields can be realized. This added flexibility could then be exploited to mitigate or enhance mutual coupling between, for example, printed elements in an array. Various computer simulations are presented to demonstrate the guiding aspect that results from the anisotropic complexities. It is stressed that both the permittivity and the permeability are described by tensors.

In addition to the simulations, various techniques are presented that can be utilized to measure the power associated with the lateral waves. This is an important addition to the presentation, as the theoretic analysis will need validation by measured data. Applications that can, potentially, exploit the anisotropy are discussed.