Abstracts

Demonstration of the Waveguiding Properties of an Artificial Surface Reactance

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We define a surface capacitive reactance as the limit of a dielectric sheet of thickness h and dielectric constant epsilon, when h tends toward zero and epsilon tends toward infinity in such a way that the product /overbar epsilon/ = epsilon h remains constant and finite. It is easy to prove that such an ideal surface capacitive reactance supports a single guided electromagnetic mode of the transverse electric (TE) type, with a very simple field profile. In this paper, we show that a fair approximation of an ideal surface capacitive reactance in the microwave domain can be realized artificially by depositing suitable metal patterns on each face of a dielectric sheet with a moderate dielectric constant. By using a two-dimensional resonator technique, we demonstrate that this artificial surface capacitive reactance bears the electromagnetic guiding properties expected for an ideal surface capacitive reactance. Application of this device to a new type of mechanically tuned resonator is briefly discussed.

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