Abstracts

Four-port scattering matrix for dual-polarized wave transmission and reflection network

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Co-directional and bi-directional, co-polarized and cross-polarized characteristics of a lossless, matched four-port transmission network have been examined. For example, an arbitrary-inclined dielectric plate in a circular or square waveguide supporting dual-orthogonal linearly polarized modes has been analyzed, and a coordinate system is defined to apply for co-directional and bi-directional propagating circularly polarized waves. The matrix elements are polarization state and network dependent. Instead of using the terms network reciprocity and matrix symmetry, the matrix elements are discussed in terms of ratios to describe co-directional, bi-directional, co-polarized, cross-polarized, and polarization discrimination properties. Some of the ratios are equal to 1/spl ang/0/spl deg/ and others 1/spl ang/180/spl deg/. Applications of this analysis are described. If the properties of the four-port network are frequency dependent and integrated over a bandwidth, and/or time dependent and integrated temporally, the scattering matrix formulation is not valid due to the presence of a randomly polarized component; in these cases a Mueller matrix is used to characterize the network.

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