Abstracts

Microwave Modeling of 2-D Active Grid Antenna Arrays

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We present a new measurement technique for determining the broadband driving point impedance of large two-dimensional active grid arrays. The active array radiates a plane wave in the broadside direction when all elements are locked in phase. For analysis, the array is reduced to a single unit cell by exploiting the array symmetries. We determine the driving point impedance of the unit cell by using the Dielectric Waveguide Measurement method (DWM). The approximations of the method are discussed and the method is compared with other measurement techniques. We present results for four square arrays: dipole, bow-tie, double-Vee and slot array. We verify our measurement method by comparing it to the full-wave theory in the whole range. We show that the results for the dipole and the bow-tie arrays agree very well with the quasistatic theory and the results of others. We extend the quasistatic theory to the doube-Vee array with excellent agreement and present a modified quasistatic circuit for the slot array. Finally, we show that all four antenna arrays can be represented by very simple circuits that use only transmission lines as circuit elements. We find that the bow-tie array represents the best choice for broadband operation.

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