Abstracts

Mode distinction and radiation-efficiency analysis of planar leaky-wave line source

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Using the first microstrip-line higher order mode as an example, mode distinction and radiation efficiency of leaky-wave line sources in the radiation region are presented in this paper. The spectral-domain approach is used to calculate complex power flows, leaving the line source in the transverse directions and those guided down the line source. By observing the behavior of these complex power flows in different frequency regions, the leaky-wave line source can be distinguished into the antenna mode and the reactive mode in the radiation region. Experimental results are shown to confirm this mode distinction. Moreover, by comparing the power carried away by the surface and the space waves, radiation efficiency of the first microstrip-line higher order mode of various structural parameters is analyzed. The microstrip line is more efficient as a leaky-wave line source when its substrate is thin, the dielectric constant of the substrate is low, and the antenna main beam is away from the end-fire direction.

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