Sidelobes Due to Periodic Amplitude and Phase Errors in the Aperture Field of a Radial Waveguide Pin-Fed Array Antenna

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Abstract—**The location and level of the sidelobes of a radial waveguide pin-fed array antenna, which stem from periodic amplitude and phase errors in the actual antenna aperture field, are derived based on a simple model of a line source as well as the pertinent model of a circular aperture. The theoretical results are verified by comparisons with numerical and measured data.**

Index Terms—**Antenna array mutual coupling, antenna arrays, antenna radiation patterns, antenna theory, radial waveguide pin-fed array antenna (RWPFAA).**

distribution found for the case of the RWPFAA studied in [3], we can further assume that except for small periodic and mutually correlated amplitude and phase errors the current is of constant unit amplitude and constant zero phase. We then have $A(x) = 1 + \Delta_a \cos \beta x$ and $\varphi(x) = \Delta_\varphi \cos \beta x$. Here, Δ_a, $0 < \Delta_a \ll 1$, denotes the magnitude of the amplitude error, and Δ_φ, $0 < \Delta_\varphi \ll 1$, denotes the magnitude of the phase error and $\beta = 2\pi/\zeta$, where ζ, $0 < \zeta < 1$, is the period of the amplitude and phase errors, normalized to half the line source