# Abstracts

## A Millimeter-Wave Integrated-Circuit Antenna Based on the Fresnel Zone Plate (May 1992 [T-MTT])

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A new type of millimeter-wave integrated-circuit antenna is investigated. The antenna is based on a quasi-optical design and consists of a Fresnel zone plate on one side of a dielectric substrate and a resonant strip dipole antenna at the focus of the zone plate on the opposite side of the substrate. The unique feature of this design is that all of the components are made using simple integrated-circuit fabrication techniques: thin film metal depositions on planar dielectric substrates. Another unusual feature of this design is the short focal length of the zone plate; the focal length/diameter (f/d) for the zone plates studied ranges from 0.1 to 0.5. The antennas described are for a frequency of 230 GHz (lambda/sub 0/ = 1.3 mm); however, the design is easily scaled to other millimeter-wave or submillimeter-wave frequencies. Measured results are reported for four different focal length zone plates. Moderate gains, above 20 dB, are obtained. A theory is developed which predicts the on-axis gain, beamwidth, and side lobe levels. Design graphs are given to aid in the selection of the geometrical parameters to achieve a desired gain from the integrated-circuit zone-plate antenna.

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