Abstracts

Millimeter-Wave Characteristics of Phase-Correcting Fresnel Zone Plates

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A focusing element called the phase-correcting Fresnel zone plate is described, and its characteristics are given when used in the millimeter-wave region for imaging or frequency filtering in place of a lens. Two versions are discussed, one where alternate concentric annular grooves are cut in a single piece of low-loss dielectric, and a second where two (or more) dielectrics are used in alternate concentric rings. For the latter case, an appropriate choice of parameters produces a design of constant thickness (i.e., a flat disk), named the "planar lens." Design formulas and curves, as well as measured results, are given for both types, and an analytical description is derived for the far-field patterns. Compared with lenses, zone plates are simpler to construct and have lower absorption loss, thickness, and weight.

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