Investigation of the resolution of phase correcting fresnel lenses with small values of f/d and subwavelength focus

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Abstract

The focusing properties of phase correcting Fresnel lenses with small values of focal length - to - diameter (F/D) and with focal lengths of two wavelengths or less are investigated. For these lenses, the paraxial approximation for the Rayleigh resolution criterion is no longer valid. For Fresnel lenses designed with $F/D < 0.2$ and $F \leq \lambda$, spatial resolutions of less than $0.5\ \lambda$ are possible, which is finer than what can typically be achieved for conventional (paraxial) designs. The spot beams in these cases are not quite axially symmetrical due to the presence of anti-symmetric field components, which vanish for larger values of F/D.

Keywords: correctingfresnel lenses, subwavelength focus, wavelength, paraxial approximation, Rayleigh resolution.

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Access full text (in Russian)

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