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Abstract
The hybrid lens is a special kind of lens with one of its two surfaces being refractive and the other being diffractive. It not only can correct chromatic aberration and other aberrations, but also can reduce system size and weight. We use Welford's aberration equation to obtain the initial phase parameters of the diffractive surface of the designed hybrid achromatic lens. Then, by the commercial optical system design software, we can optimize the hybrid lens and perform aberration analysis. We assume the diffractive surface of the hybrid lens is fabricated by single-point diamond turning technique, which is the most widely used technique to fabricate the diffractive surface of a hybrid lens. To model effects of fabrication errors, we simulate diffraction efficiencies, PSF (point spread function) and MTF (modulation transfer function) of diffractive surfaces fabricated by different types of diamond turning tools and different tools radii.
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