Singlet lenses free of all orders of spherical aberration

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Abstract

This paper describes a method to design families of singlet lenses free of all orders of spherical aberration. These lenses can be mass produced according to Schwarzschild's formula and therefore one can find many practical applications. The main feature of this work is the application of an analysis that can be extended to grazing or maximum incidence on the first surface. Also, here, the authors present some developments that corroborate geometrical optics results, along with the axial thick lensmaker's formula, which can be applicable to any pair of finite conjugate planes for any lens shape (bending) and can be used instead of the classical thick lensmaker's formula, which always assumes that the object is at infinity, to attain better accuracy.