

Tight Focusing of Wavefronts with Piecewise Constant Phase

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Abstract: The Richards-Wolf approach to analyze tight focusing by high numerical aperture aplanatic optical systems can only be applied to incident waves having a planar (or negligibly curved) wavefront at the entrance pupil. In some cases, however, such as certain singular beams, the incident wave can be represented by a wavefront with, approximately, piecewise constant phase. For wavefronts of this kind we extend the validity of the Richards-Wolf approach to approximate evaluation of the field distribution in the vicinity of the geometrical focus. The proposed method is applied to the derivation of the focal distribution obtained by placing a mask with a π phase shift at the entrance pupil.

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