# Abstracts

## Long-Wave Optics

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In this paper we set out the bases of the near-complete analytical methodology that now exists for the design of long-wave optical systems. We follow the Gaussian beam-mode treatment of free-space propagation, extend it to cover the transformations produced by conic-section reflectors or lenses, and incorporate both the propagation steps and the lens transformations into a matrix formulation readily applicable to networks of such reflectors or lenses. We demonstrate in the process the theorems of Fourier Optics and keep explicit the vectorial properties of the beam-fields. We show how recent formulations of partial coherence have made it possible to include partially-coherent beams in the same methodology. For the design of high-performance systems, the inclusion of higher-order mode-dispersion must be fully understood, the vector properties must be recoverable, and the paraxiality on which the methodology rests must be critically assessed. This paper gives emphasis to these aspects and presents a single systematic formulation embracing all the elements.

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