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# Modelling of Diffractive/Meta-Lenses Using Fast Physical Optics

**SPIE - Optical Modelling and System Alignment**

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**Abstract**

The growing importance of diffractive and meta-lenses in modern optical systems makes it vital to investigate and understand their capabilities. They play an important role in various applications like imaging systems, laser-beam shaping, bio/medical-optics, etc. We propose methods for the modeling of diffractive and meta-lenses based on the concept of the fast-physical-optics approach. A diffractive or meta-lens can be modeled as a series of structures functioning locally (e.g. local gratings) on a base interface. Each local structure introduces a certain local phase modulation, and by putting all of them together, the lens functionality can be achieved. In our approach, the rigorous Fourier modal method (FMM), also known as the rigorous coupled wave analysis (RCWA), is applied for the analysis of the local micro-/nanostructures, with all vectorial effects and possible higher-order effects taken into consideration; then the phase modulations can be collected for the lens function modeling. In this manner, a multi-scale simulation of optical systems with diffractive/meta-lenses becomes feasible and efficient in practice.