SPIE 9581, Laser Beam Shaping XVI, 958104, San Diego, California, United States, 09 August 2015

Angular Accelerating White Light

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Abstract

Significant interest has been devoted to tailoring optical fields that transversely accelerate during propagation in the form of Airy, Weber and Mathieu beams. In this work, the authors introduce a new type of optical field that exhibits controlled angular acceleration during propagation which is achieved by superpositions of Bessel beams with non-canonical phase functions. They demonstrate these angular accelerating fields by modulating the phase and amplitude of a supercontinuum source with the use of a phase-only spatial light modulator (SLM). They illustrate that by considering only the first diffraction order when the SLM is encoded with a blazed grating, the SLM is capable of tailoring the spatial profile of broadband sources without any wavelength dependence. By digitally simulating free-space propagation on the SLM, The authors compare the effects of real and digital propagation on the angular rotation rates of the resulting optical fields for various wavelengths. The development of controlled angular accelerating optical fields will be useful in areas such as particle manipulation, plasma control, material processing and non-linear optics.