FRACTIONAL FOURIER TRANSFORM OF MODIFIED LAGUERRE–GAUSSIAN BEAMS

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Abstract

The fractional Fourier transform (FRFT) has been widely used in beam analysis, beam shape studies, and signal processing. Modified Laguerre–Gaussian beams (MLGBs) are special cases of vortex beams which are non-diffracting or have a definite value of the photon orbital angular momentum along the propagation direction. Because of the universality and characteristics of MLGBs, propagation properties of MLGBs has attracted increasing interest in recent years. In this article, the properties of MLGBs propagating through a FRFT optical system have been investigated. The analytical transformation formulae for MLGBs propagation through a FRFT optical system are derived based on definition of the FRFT in the cylindrical coordinate system. By using the derived formula, the normalized intensity distribution of an MLGBs in the FRFT plane is graphically illustrated with numerical examples, and the influences of the different parameters on the normalized intensity distribution are discussed.

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