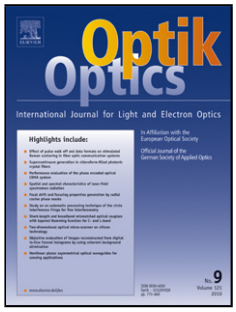

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Effect of aberration correction on beam wander of electromagnetic Multi-Gaussian Shell-model beams in anisotropic turbulence

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Abstract: The influences of source parameters, non-Kolmogorov and anisotropic turbulence on the beam spreading and beam wander of electromagnetic Multi-Gaussian Shell-model (EMGSM) beams in the atmosphere with aberration correction were analyzed. Zernike tilt aberration correction method had more effect on beam spreading compared to beam wander. Increasing the anisotropic property of turbulence could degrade both beam spreading and beam wander. EMGSM beams with larger beam order, wavelength could better mitigate the turbulence effects than GSM beams, which could be adopted as a better light source with several adjustable parameters to lower scintillation and beam wander in free-space optical communication.

Keyword: beam wander; electromagnetic Multi-Gaussian Shell-model beams; anisotropic turbulence; aberration correction.

1. Introduction

The propagation behaviors of electromagnetic partially polarized beams through atmospheric turbulence have recently been extensively investigated [1] based on the unified theory of coherence and polarization [2]. Theoretical and experimental investigations show that an electromagnetic partially polarized beam shows a significant advantage over fully coherent or polarized ones in lowering the turbulence-induced scintillation [3-4]. This approach has potential applications in remote sensing, tracking, optical imaging, and free-space optical (FSO) communications [5]. Beam wander is an