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Statistical distribution of the OAM states of Bessel-Gaussian Schell infrared beams in strong turbulent atmosphere

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Abstract

The effects of strong turbulence on the orbital angular momentum (OAM) states of infrared and non diffraction beam propagation in a terrestrial atmosphere are investigated. A new probability density model for OAM states of Bessel-Gaussian Schell beam in the paraxial and strong turbulent channel is modeled based on the modified Rytov approximation. We find that the normalization energy weight of signal OAM modes at each OAM level is approximate equivalence in strong turbulence regime, one can constitute multiple mode channels by choosing OAM modes with large energy level difference between modes to reduce mode interference, and one can utilize BGS beam with OAM modes increasing the channel capacity of optical communications.

Keywords: orbital angular momentum, Bessel-Gaussian Schell beam, mode probability density, modified Rytov method, strong turbulence
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