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Propagation behavior of a generalized Hermite cosh–gaussian laser beam through marine environment

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Abstract

Based on the extended Huygens–Fresnel principal, we investigate the propagation behavior of a Generalized a Hermite cosh–Gaussian (GHCG) beam through random medium namely maritime atmospheric turbulence. The analytical formula for the GHCG beam propagating in the considered medium is derived. The influences of the maritime turbulence parameters and the source beam parameters on the propagation characteristics of the GHCG beam are illustrated using numerical calculations. The results show that the evolution behavior of average intensity for a GHCG beam through maritime turbulence will gradually lose its properties and its resistance to fluctuations and then evolve faster into Gaussian distribution in the far field as the turbulent constant structure increases and as the inner scale size of the turbulence decreases. The propagation of optical radiation across this medium has differing impacts compared to the atmosphere above land. The obtained results can be significantly contributed to the practical application for free–space optical communication and remote sensing.

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