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Vikrant Bhateja ·
P. Satish Rama Chowdary ·
Wendy Flores-Fuentes · Shabana Urooj ·
Rudra Sankar Dhar *Editors*

Evolution in Signal Processing and Telecommunication Networks

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Numerical Study of Laguerre–Gaussian Beams and Analysis of OAM Based OOK Communication System

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Girish Abhyankar, Sandeep Gawali, Narayan Vetrekar, R. S. Gad & G. M. Naik

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Abstract

In present era, where the demand for increased bandwidth is constantly rising, achieving higher spectral efficiency is an imperative necessity. A potential answer to the need in this direction is optical communication. Due to their theoretically limitless and orthogonal modes that can be effectively multiplexed, laser light beams carrying orbital angular momentum (OAM) have introduced a new paradigm in data transfers. We examined the intensity profiles and phase structures of Laguerre–Gaussian (LG) beams with various orders of topological charges in this research. The propagation characteristics of LG beams are simulated. The data communication system model simulated for the numerical study uses an OAM carrying LG beam as the carrier, ON–OFF keying for modulation, and an AWGN channel for additive white Gaussian noise. The bit error rates (BER) were calculated using the modelled system for a range of signal-to-noise ratio (SNR), and the outcomes are consistent with the predictions made by theory.