P. Suresh et al., Madridge J Nanotechnol Nanosci. 2018
http://dx.doi.org/10.18689/2638-2075.a3.004

3rd International
Nanotechnology Conference & Expo
May 7-9, 2018 Rome, Italy

Enhancement of Sub Wavelength Focal Depth using Specially Designed Spiral Phase Plate

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In this article, tight focusing of azimuthally polarized beam through a specially designed multibelt spiral phase hologram with annular obstruction is studied numerically based on vectorial diffraction theory. Simulation result shows the generation of transversally polarized beam in the focal region with radial and azimuthal components. It is observed that this specially designed optical element can generates a transversely polarized beam with long focal depth (11.32λ) and much reduced spot size (0.28λ), the polarization property also remains unchanged entire focal depth in the focal region, which should be considered in some practical applications. By calculating Stokes parameters, it is also shown that the generated nondiffracting beam propagates without divergence in the focal segment and keeps almost invariant polarization in the main lobe along the optical axis. Such a beam may find applications in optical trapping, microscopy, semi-conductor inspection and optical manipulation technology.

Keywords: Depth of focus, Polarization, Diffractive optical element, High NA lens.

Biography:

Dr. P. Suresh graduated in Electronics and Communication Engineering, from Anna University in 2008. In the year 2010, he received his Master's degree in Embedded System Technologies from Anna University of Technology and Doctoral Degree from Anna University in 2014. His research interests are in the field of Optical Engineering, Nano Photonics, Nano Optics, System on Chip, Reconfigurable computing, Embedded Syetms, etc,. Currently working as Associate Professor in Dept. of Electronics and Communication Engineering at Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai.