**Abstract**

Focusing properties of the azimuthally polarized axisymmetric Bessel-modulated Gaussian beam optical vortex focused through a dielectric interface by in high numerical aperture system is investigated theoretically by vector diffraction theory. Results show that intensity distribution in focal region can be altered considerably by beam parameter μ and polarization angle. While μ alters axial intensity distribution remarkably, focal splitting may occur with tunable focal shift, and real value μ also may induce local intensity minimum. For certain case, with increasing imaginary value μ, transverse focal spot shrinks accompanied with higher full width half maximum of axial intensity distribution,which is suitable for application such as optical manipulation and optical trapping.