Self Focusing and defocusing of twisted light in non-linear media[1]

ANITA THAKUR, Max Planck Institute of Microstructure Physics, JAMAL BE-RAKDAR, Institute of Physics, Martin Luther University Halle-Wittenberg — The Self-focusing of light beams is a basic phenomena in nonlinear optics with a variety of important applications that rely on the manipulation and control of the photon beam. Generally, the theory of self focusing is well established with the propagation characteristics found to be closely related to the properties of the medium and to the pulse width of laser beams. Here, we are reporting the study of the self-focusing and defocusing of a light beam carrying orbital angular momentum (called twisted light) propagating in a nonlinear medium. We derive a differential equation for the beam width parameter f as a function of the propagation distance, angular frequency, beam waist and intensity of the beam. The method is based on Wentzel-Kramers-Brillouin(WKB) and the paraxial approximations. Analytical expressions for f are obtained, analyzed and illustrated for typical experimental situations.

[1]International Max Planck Research School of Microstructure Physics, Halle(Saale)

Anita Thakur
Max Planck Institute of Microstructure Physics &
Institute of Physics, Martin Luther University Halle-Wittenberg