Impact of human upper dermis tissue on the spectral intensity of a pulsed chirped general model vortex higher–order cosh–Gaussian beam

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Abstract

Based on the power spectrum refractive index, the extended Huygens–Fresnel integral, and the Fourier Transform method, an analytical formula for a pulsed chirped General Model vortex Higher–order cosh–Gaussian beam propagating through human upper dermis tissue are derived. Numerical simulations are presented to illustrate how the evolution properties of the beam are affected by varying beam parameter configurations through the human upper dermis tissue. Results shows that the pulsed chirped GMvHchGB undergoes changes in its shape as it traverses a considerable distance through this medium. The influence of incident beam parameters such as Gaussian waist, cosh parameter, hollowness, and beam order are illustrated in detail. We anticipate that the results obtained in the present work are significant in developing bio–optical disease detection and treatment technologies especially for cancer. Based on the difference in the intensity distribution, scientists can detect the diseases.