


Analysis on the propagation characteristics of a Generalized Hermite cosh–Gaussian beam through human upper dermis tissue

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Abstract

Based on the extended Huygens–Fresnel principle, the analytical formula for a Generalized Hermite cosh–Gaussian beam (GHchGB) propagating through human upper dermis tissue is derived in this paper. From the derived formula, numerical illustrative examples are performed to illustrate the propagation properties of the considered beam in human upper dermis tissue. Results show that the evolution of the intensity pattern of GHchGB depends strongly on the source beam parameters such as Gaussian beam waists, decentered cosh parameter, hollowness parameter, beam orders and wavelength. It is found that the GHchGB with a smaller parameter in the human upper dermis evolves into the Gaussian beam faster as the propagation distance increases. This observation suggests that the resistance of the GHchGB against turbulence increases as the source parameter increases. The significance of the obtained results has the potential application in the development of bio–optical disease detection and treatment technology.