






Study on the properties of pulsed chirped beams propagating in human upper dermis tissue

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Abstract

Pulsed chirped beams propagating in human upper dermis tissue present intriguing characteristics and applications in medical imaging and diagnosis. This study delves into the analytical formulation of their propagation, specifically focusing on a pulsed chirped Laguerre higher-order cosh-Gaussian beam (LhchGB). Through the integration of power spectrum refractive index, extended Huygens-Fresnel integral, and Fourier Transform methods, we derive comprehensive analytical expressions for beam propagation. We numerically simulate the corresponding beam under different parameters and study the influence of each beam parameter on the spectral modifier during beam propagation. Additionally, we evaluate how the pulse duration and chirp parameter impact the spectral intensity at various observation positions. The results also indicate that as the pulsed chirped LhchGB traverses a considerable distance through this medium, it undergoes changes in its shape. The findings reveal that as the pulsed chirped LhchGB traverses through the dermis tissue, it undergoes significant changes in shape, underscoring its potential significance in medical applications.