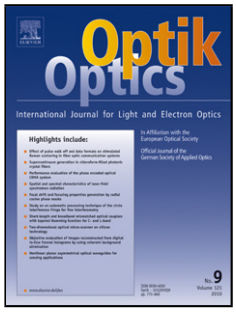

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Effects of liver tissue turbulence on propagation of annular beam

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Abstract

Effects of tissue turbulence on the propagation properties of an annular laser beam is examined. In this respect, the average intensity profile and the beam spread at the observation plane are formulated and evaluated after the annular laser beam propagates through the turbulent liver tissue. In our formulation, the extended Huygens-Fresnel method is utilized with the involvement of the turbulence power spectrum of the liver tissue. Results obtained from the performed simulations include the variations of the received average intensity and the effective beam size of the annular beam against the changes in the liver tissue turbulence and the laser beam parameters, i.e., against the laser wavelength, tissue length, primary and secondary source sizes of the annular laser beam. Our work in this paper will prove to be helpful in obtaining clues to diagnose abnormalities such as cancer and tumor in a liver tissue.

Keywords: tissue turbulence, optical wave propagation, optical imaging, effective beam size, optical intensity