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Non-diffractive beam in random media

Tatsuo Shiina
Chiba University, Japan

Beam propagation has been given strong attention in a variety of applications that is, medicine, remote sensing and information science. Especially, the beam propagation in highly scattering media, which is called random media, gathers highly emotion to control from the past to the present. In general, the multiple scattering gets rid of beam characteristics such as intensity distribution, phase front and polarization. In this study, self-converging effect of a polarized annular beam was applied in random media. The collimated annular beam of a few tens millimeters takes a few hundred meters to transform its beam shape into the non-diffractive beam in air, while this transformation was shorten only to less than a few tens centimeters in random media with a certain concentration. The generation condition of the non-diffractive beam in random media is not only the incident beam and the media characteristics, but the obserbation condition is also important. The specialized detector was installed with narrow field of view in our experiment. The detected beam has its optical characteristics of the non-diffractive beam. It has the center peak and side rings in optical axis and keeps its waveform in its propagation. Media concentration and propagation distance control the generation and the waveform of the non-difractive beam. The center peak of the non-difractive beam has the unique behavior due to the media concentration. This study indicates the generation of the non-diffractive beam in random media, its waveform structure on the isotropic multiple-scattering and the unique behavior of the alternative change of its waveform.

Biography

Tatsuo Shiina received his BE, ME and DE degrees in Electrical Engineering from Science University of Tokyo, Tokyo, Japan. He is working as an Associate Professor at Graduate School of Advanced Integration Science, Chiba University. He studies near range compact lidar for disaster prediction, portable OCT for industrial use and beam propagation in random media.

shiina@faculty.chiba-u.jp

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