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Investigation of dual photonic nanojets generated based on near-field diffraction from bifocal Fresnel zones

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Abstract

This article investigates the formation of Photonic Nanojets (PNJs) produced by ring-shaped structures with a Fresnel-like geometric distribution using the Reduced Discrete Dipole Approximation (RDDA) method. Three structures with geometric distributions of regular rings, rings aligned with Fresnel zones, and bifocal Fresnel zones have been studied. The formation and optimization of dual PNJs (two simultaneous photonic nanojets) along the propagation axis have been found by dividing the Fresnel zones into two regions, as well as by adjusting the average focal length f_{avg} and the disk radius R , which leads to a change in the number of primary Fresnel zones in each divided region. The Best decoupled and confined dual PNJs from the proposed structures have been identified for several optimized states.

Keywords: Photonic Nanojet, Reduced Discrete Dipole Approximation method, Bifocal Fresnel zones

For full article, refer to the Persian section