Iranian Journal of Physics Research, Vol. 22, No. 3, 2022
DOI: 10.47176/ijpr.22.3.11397

Orbital angular momentum tuning of second harmonic generation of a laser beam

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(Received 18 January 2022 ; in final form 20 June 2022)

Abstract
Laser beams carrying orbital angular momentum have found numerous applications in various branches of sciences especially in modern quantum communications. Frequency conversion of these beams using nonlinear crystals allows the desired spectral ranges to be achieved. In this work, first, the optimal value of the focusing parameter and the location of the focus of the pump beam with orbital angular momentum in second harmonic generation process are determined. Then, based on the dependence of the optimal value of the phase mismatch parameter on the Laguerre-Gaussian mode order contained in the pump beam, a novel method for varying of the orbital angular momentum of the generated second harmonic beam is presented. According to this method, for pump beams with fractional orbital angular momentum, by changing the focusing parameter, the angular momentum of the second harmonic generation beam can be continuously tuned.

Keywords: Laguerre-Gaussian beams, orbital angular momentum, second harmonic generation.

For full article, refer to the Persian section