

Noncritical Phase-Matched Fourth Harmonic Generation of Converging Beam by Deuterated Potassium Dihydrogen Phosphate Crystal

Authors : Xiangxu Chai, Bin Feng, Ping Li, Deyan Zhu, Liquan Wang, Guanzhong Wang, Yukun Jing

Abstract : In high power large-aperture laser systems, such as the inertial confinement fusion project, the Nd: glass laser (1053nm) is usually needed to be converted to ultraviolet (UV) light and the fourth harmonic generation (FHG) is one of the most favorite candidates to achieve UV light. Deuterated potassium dihydrogen phosphate (DKDP) crystal is an optimal choice for converting the Nd: glass radiation to the fourth harmonic laser by noncritical phase matching (NCPM). To reduce the damage probability of focusing lens, the DKDP crystal is suggested to be set before the focusing lens. And a converging beam enters the FHG crystal consequently. In this paper, we simulate the process of FHG in the scheme and the dependence of FHG efficiency on the lens' F is derived. Besides, DKDP crystal with gradient deuterium is proposed to realize the NCPM FHG of the converging beam. At every position, the phase matching is achieved by adjusting the deuterium level, and the FHG efficiency increases as a result. The relation of the lens' F with the deuterium gradient is investigated as well.

Keywords : fourth harmonic generation, laser induced damage, converging beam, DKDP crystal

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