Guangwen Huo et al., J Laser Opt Photonics 2016, 3:2 (Suppl)
http://dx.doi.org/10.4172/2469-410X.C1.005

A generalized method for calculating phase matching conditions in biaxial crystals

Guangwen Huo[1], **Heng Chen**[1] and **Meizhi Zhang**[2]
[1]Xijing University, China
[2]Xi'an University of Posts and Telecommunications, China

We present a generalized method for calculating phase matching conditions in biaxial crystals, especially in nonlinear monoclinic and triclinic crystals. Exploiting the angle definition introduced by Japanese mathematician Kodaira Kunihiko, we deduce the angular relations in geometry and obtain the expressions of refractive indices depending on angular orientation of wave vector k and optical axis angle. Then we calculate the phase matching parameters with bismuth borate BiB_3O_6 (BIBO) crystal in spontaneous parametric down conversion (SPDC) process for the type I and type II. On its basis, we discuss the angular gradients of the pump and emission wave refractive index near the exact phase matching direction, and compare the SPDC with double frequency process in geometrical relations of the refractive index ellipsoids. It indicates the anisotropic structures of nonlinear crystals making a capability of filtering effect, and the nonzero linear mismatch described by refractive index angular gradients can be used to estimate the beam width in crystal. This method is convenient to calculate the phase matching parameters in orthorhombic crystals without solving the quadratic Fresnel equations.

Biography

Guangwen Huo has completed his PhD degree (Master–Doctor combined program) from the Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences in 2014. He is now a Lecturer working at the College of Control Engineering, Xijing University. He has published more than 10 papers on nonlinear crystals in reputed journals. His main works include quantum optics, quantum calculating and quantum information.

guangwenhuo@126.com

Notes: