Report on Advanced Photon Science XVI

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Submitted to Room 208(教務), Science Buiding 1

1. In 2nd-order nonlinear materials, two imput optical fields having frequencies of ω_1 and ω_2 couple and generate Sum Frequency Generation (SFG) and Difference Frequency Generation (DGF). Discuss about the difference between SFG and DFG in application viewpoints.

2. In DFG, input optical fields of ω_1 and ω_2 couple with the pump field ω_3 and their amplitudes A_1, A_2 and A_3 along the propagation direction z are given by the folowing equatins.

$$\begin{cases} \dfrac{dA_1}{dz} = i\kappa_1 A_3 A_2^* e^{-i\Delta kz} & (1) \\ \dfrac{dA_2}{dz} = i\kappa_2 A_3 A_1^* e^{-i\Delta kz} & (2) \\ \dfrac{dA_3}{dz} = i\kappa_3 A_1 A_2 e^{i\Delta kz} & (3) \end{cases}$$

where $\omega_3 > \omega_2 > \omega_1$.

Assuming $A_3 \gg A_1$ and A_2 ($dA_3/dz = 0$), show the propagation dependence of the intensities of the optical field of ω_1 and ω_2.