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NPTEL

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Courses » Introduction to Non-linear Optics and its Applications

Announcements Course Ask a Question Progress Mentor FAQ

Unit 9 - Week 7

Course outline

Week 7 Assignment 7

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-09-19, 23:59 IST.

1) *2 points*

Consider different frequency interaction($\omega_1 - \omega_2 = \omega_3$), where the corresponding to ω_1 is treated as constant throughout the crystal (Undep pump approximation). The coupled amplitude equations for $\Delta k = 0$ are (w

$\kappa_i = \frac{\omega_i d_{eff}}{n_i\, c}$)

(a) $\frac{dA_1}{dz} = i\kappa_1 A_2 A_3$, $\frac{dA_2}{dz} = i\kappa_2 A_1 A_3^*$, $\frac{dA_3}{dz} = i\kappa_3 A_1 A_2^*$

(b) $\frac{dA_1}{dz} = i\kappa_1 A_2 A_3^*$, $\frac{dA_2}{dz} = i\kappa_2 A_1 A_3^*$, $\frac{dA_3}{dz} = i\kappa_3 A_1 A_2$

(c) $\frac{dA_1}{dz} = i\kappa_1 A_2 A_3$, $\frac{dA_2}{dz} = i\kappa_2 A_1 A_3$, $\frac{dA_3}{dz} = i\kappa_3 A_1 A_2$

- (a)
- (b)
- (c)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)

2) *2 points*

For Q1 the governing equation for the field $A_2(z)$ is (where $\alpha = \sqrt{\kappa_2\, \kappa_3 |A_1|^2}$

(a)$\frac{d^2 A_2}{dz^2} + \alpha^2 A_2 = 0$ (b)$\frac{d^2 A_2}{dz^2} = 0$ (c)$\frac{d^2 A_2}{dz^2} - \alpha A_2 = 0$ (d)$\frac{d^2 A_2}{dz^2} - \alpha^2 A_2 = 0$

- (a)
- (b)
- (c)
- (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(d)

3) *2 points*

For Q1 if the initial conditions are $A_1(0) = A_{10}$, $A_2(0) = A_{20}$ and $A_3(0) = 0$

Assignment Solution

(b)

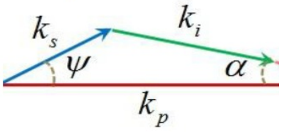
(c)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c)

4) *2 points*

For a sum frequency generation process ($\omega_i = \omega_p + \omega_s$) if the angle between wave vector k_p and k_s is ψ , then the angle between k_p and k_i is



(a) $\tan^{-1}\dfrac{(k_p/k_s)\sin\psi}{1+(k_s/k_p)\cos\psi}$ (b) $\tan^{-1}\dfrac{(k_s/k_p)\sin\psi}{1-(k_s/k_p)\cos\psi}$

(c) $\tan^{-1}\dfrac{(k_s/k_p)\sin\psi}{1-(k_p/k_s)\cos\psi}$ (d) $\tan^{-1}\dfrac{(k_s/k_p)\sin\psi}{1+(k_p/k_s)\cos\psi}$

(a)

(b)

(c)

(d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(b)

5) *2 points*

For achieving noncollinear phase matching in a sum frequency gener process ($\omega_i = \omega_p + \omega_s$) the angle between the wave vectors k_p and k_s is

(a) $\cos^{-1}\dfrac{k_p^2+k_s^2-k_i^2}{2k_pk_i}$ (b) $\cos^{-1}\dfrac{k_p^2+k_s^2-k_i^2}{2k_ik_s}$ (c) $\cos^{-1}\dfrac{k_p^2+k_s^2-k_i^2}{2k_pk_s}$

(a)

(b)

(c)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c)

6) *2 points*

A phase-matching configuration is possible in beta-barium borate (BBO) in v two separate non-collinear beams at 1.064 μm generate a second harmonic b at 0.532 μm. Assuming the refractive indices are same for both the waveleng the angle between the two fundamental beams is

(a) 180° (b) 40.06° (c) 30.1° (d) 90°

(a)

(b)

(c)

(d)

No, the answer is incorrect.

Score: 0

Accepted Answers:
(a)

7) *2 points*

A phase-matching configuration is possible in a crystal in which two separat non-collinear beams at 1.064 μm generate a second harmonic beam at 0.532 If the effective refractive indices at the two wavelengths are 1.59400and 1.5(respectively, the angle between the two fundamental beams is
(a) 180° (b) 140° (c) 92° (d) 0°

- (a)
- (b)
- (c)
- (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(b)

8) *2 points*

In optical parametric amplification process power is flowing
(a) from lower frequency to the higher frequency (b) from higher frequen the lower frequency (c) no energy transfer takes place

- (a)
- (b)
- (c)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(b)

9) *2 points*

Degenerate parametric amplification process is exactly opposite to
(a) SHG (b) DFG (c) electro optic effect (d) none of these

- (a)
- (b)
- (c)
- (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)

10) *2 points*

For type-I phase matching which of the following is for positive uniaxial crys
(a) $e \rightarrow o + o$ (b) $e \rightarrow e + o$ (c) $o \rightarrow o + e$ (d) $o \rightarrow e + e$

- (a)
- (b)
- (c)
- (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(d)

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