

Θεμα 1

(α)

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} = \begin{pmatrix} 0.4750 & 27.50 \text{ mm} \\ -0.0292 \text{ mm}^{-1} & 0.4167 \end{pmatrix}$$

(β)

$$x = 30 \text{ mm} \quad \text{real image} \quad m = -0.40$$

(γ)

$$\begin{aligned} r = v &= \frac{D - 1}{C} = 20.0 \text{ mm} \\ s = w &= \frac{1 - A}{C} = -18.0 \text{ mm} \\ f_1 &= \frac{1}{C} = -34.2857 \text{ mm} \\ f_2 &= -\frac{1}{C} = +34.2857 \text{ mm} \end{aligned}$$

(δ)

$$\begin{aligned} f &= 34.2857 \text{ mm} \\ OV_1 &= 100.00 \text{ mm} \\ s &= 120.00 \text{ mm} \\ s' &= 48 \text{ mm} \\ V_2I &= 30 \text{ mm} \\ m &= -\frac{48}{120} = -0.40 \end{aligned}$$

Θεμα 2

(α)

$$\begin{aligned} \Delta\theta &= 1.3102 \times 10^4 \text{ rad} = 0.0075^\circ \\ z_0 &= 38.1632 \text{ m} \\ w(z = 1 \text{ m}) &= 65.55 \text{ mm} \end{aligned}$$

(β)

$$n = 9.3211 \times 10^8$$

$$I_0 = 6.055 \times 10^{10} \text{ lumen/sr}$$

(γ)

$$L_v = 1.542 \times 10^{15} \text{ lumen/m}^2 \text{sr}$$

Θεμα 3

(α)

$$F = 1.5920 \times 10^5$$

(β)

$$\Delta\lambda_{min} = 0.166848 \times 10^{14} \text{ m}$$

$$\mathcal{R} = 3.79267 \times 10^8$$

(γ)

$$t = 191.465 \text{ mm}$$

(δ)

$$FSR = 7.834 \times 10^8 \text{ Hz}$$

Θεμα 4

(α)

$$I(x) = I_0 \frac{\sin^2 \left[k \frac{s}{2L} x \right]}{\left[k \frac{s}{2L} \right]^2} \frac{\sin^2 \left[3k \frac{d}{2L} x \right]}{\sin^2 \left[k \frac{d}{2L} x \right]}$$

(β)

$$\text{diffraction} : x_{min} = m10 \text{ (cm)} \quad m \in Z, m \neq 0$$

$$\text{interference} : x_{max} = m' \text{ (cm)} \quad m' \in Z$$

$$\text{interference} : x_{min} = m_1/3 \text{ (cm)} \quad m_1 \in Z \quad \text{and} \quad m_1 \neq 3m'$$

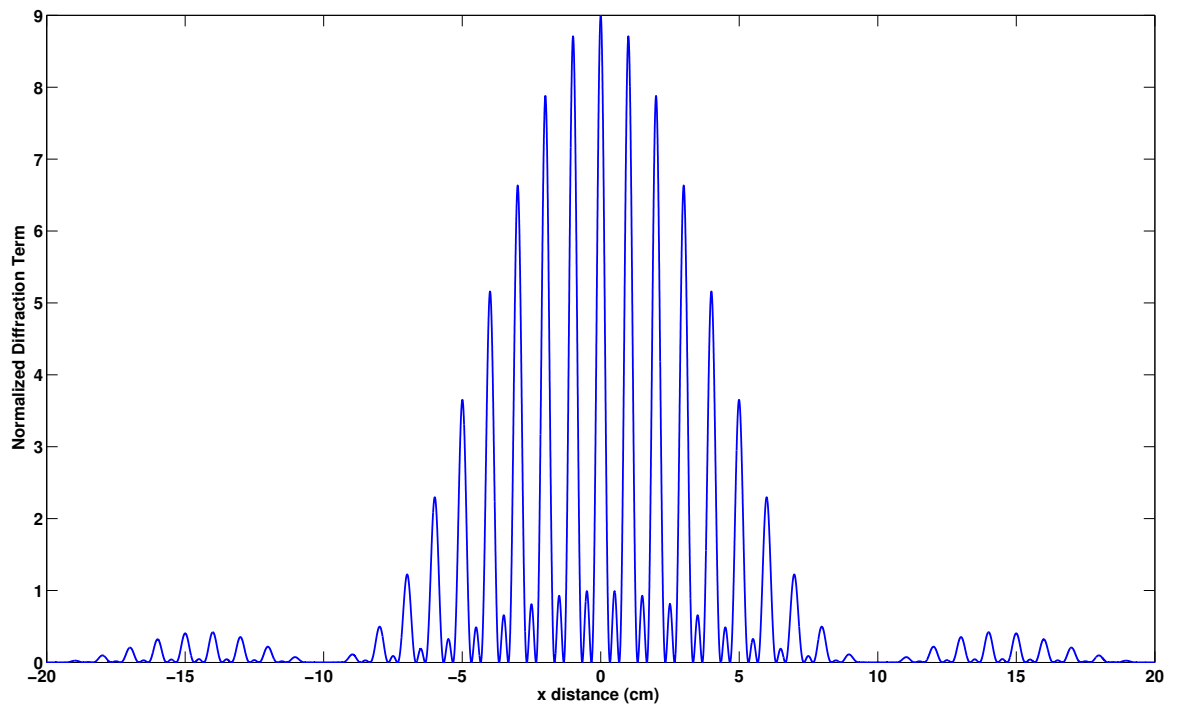


Figure 1: Normalized Intensity, $I(x)/I_0$.