SESSION 4 Winter 2025

GRIFFITHS 9.10

$$P = \frac{I}{c} = \frac{1.3\ 10^3}{3\ 10^8}\ \frac{N}{m^2}$$

$$P = 4.3\ 10^{-6}\ \frac{N}{m^2}$$

For a perfect reflector, multiply by two

Atmospheric Pressure $1.0\ 10^5\ N/m^2$

$$\text{Ratio} = \frac{4.3\ 10^{-6}}{1.0\ 10^5} = 8.3\ 10^{-11}$$

GRIFFITHS 9.3

Let $kz - \omega t = \alpha$ to make algebra easier to write down

$$\tilde{A}_3 = A_3 e^{i(\alpha+\delta_3)} \quad \tilde{A}_2 = A_2 e^{i(\alpha+\delta_2)} \quad \tilde{A}_1 = A_1 e^{i(\alpha+\delta_1)}$$

$$\tilde{A}_3 = \tilde{A}_1 + \tilde{A}_2$$

$$A_3 e^{i\delta_3} = A_1 e^{i\delta_1} + A_2 e^{i\delta_2}$$

$$\begin{cases} A_3 \cos\delta_3 = A_1 \cos\delta_1 + A_2 \cos\delta_2 & (1a) \\ A_3 \sin\delta_3 = A_1 \sin\delta_1 + A_2 \sin\delta_2 & (1b) \end{cases}$$

Take the square of eqtns 1a and 1b and add them together

$$A_3^2 = A_1^2 + A_2^2 + 2A_1A_2\left[\cos\delta_1\cos\delta_2 + \sin\delta_1\sin\delta_2\right]$$

$$= \cos(\delta_1 - \delta_2)$$

$$\boxed{A_3 = \sqrt{A_1^2 + A_2^2 + 2A_1A_2\cos(\delta_1 - \delta_2)}}$$

Now take the ratio of (1b)/(1a)

$$\tan\delta_3 = (A_1\sin\delta_1 + A_2\sin\delta_2)/(A_1\cos\delta_1 + A_2\cos\delta_2)$$

$$\delta_3 = \tan^{-1}\left[\frac{A_1 \sin\delta_1 + A_2 \sin\delta_2}{A_3 \cos\delta_1 + A_3 \cos\delta_2}\right]$$