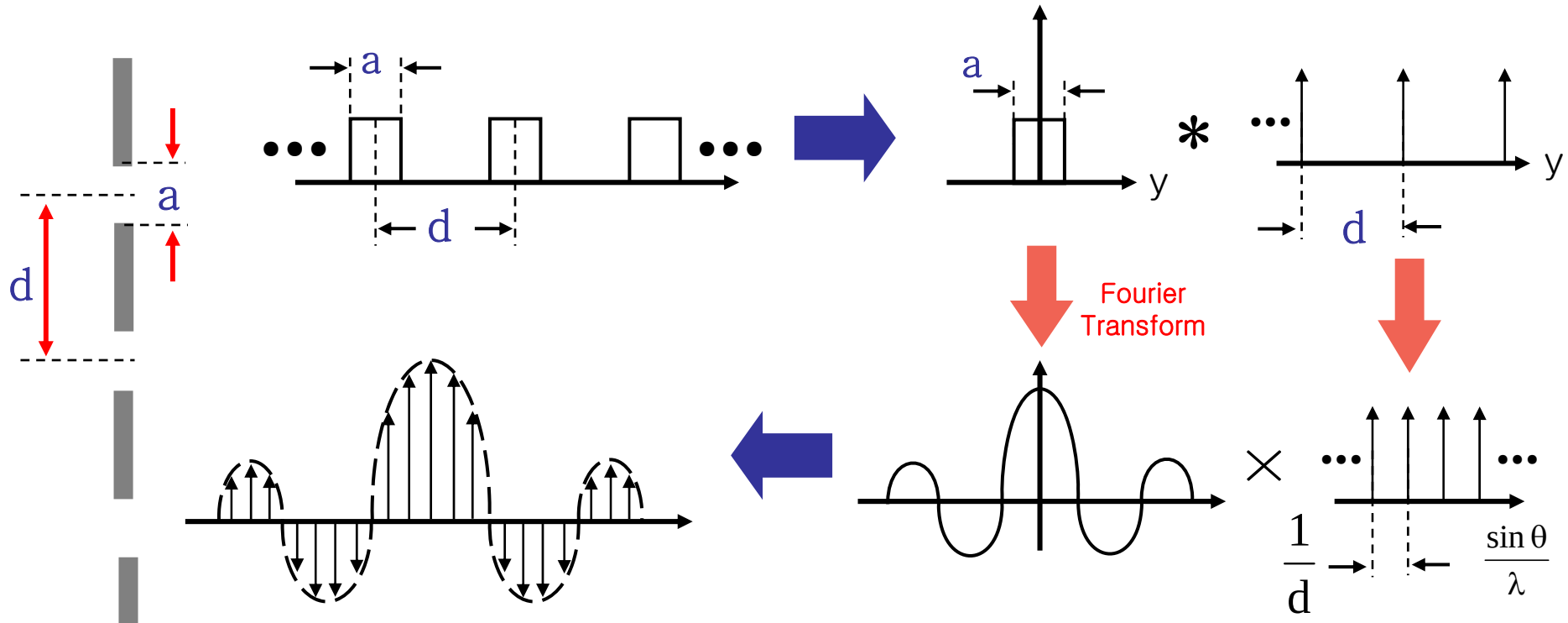
Lect. 10: Diffraction Gratings

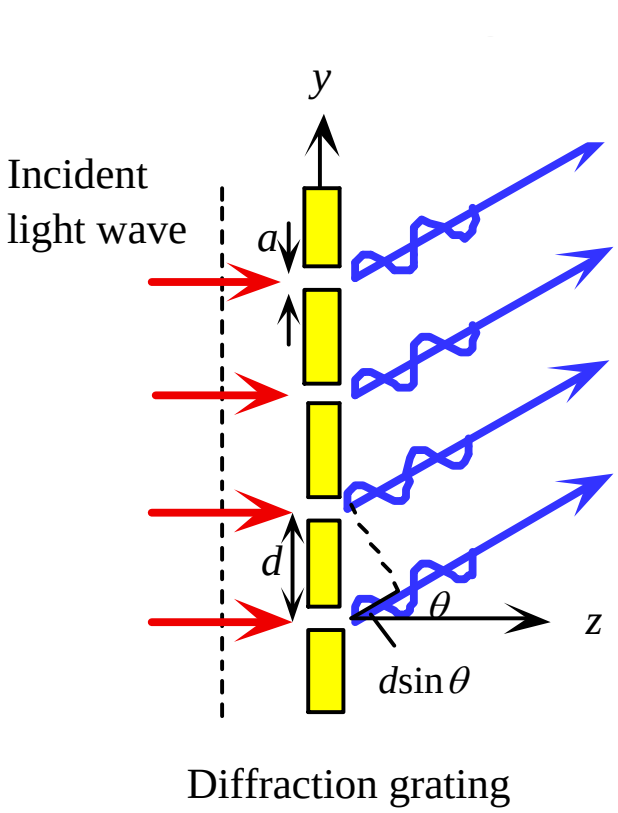


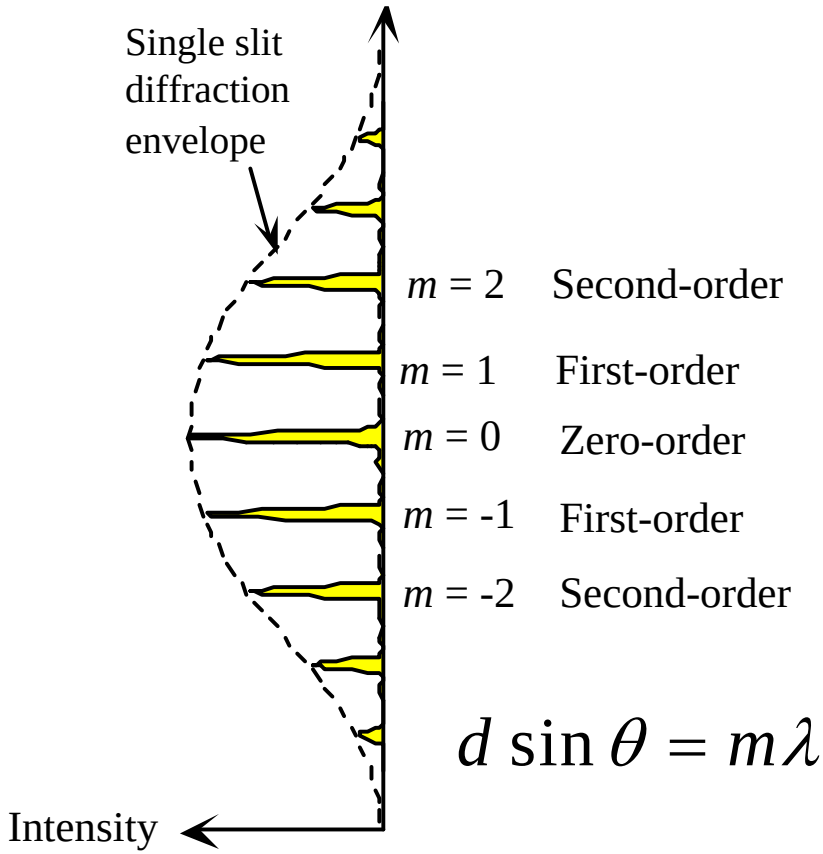
Diffracted light from periodic slits (Grating) =>only at discrete angles

$$\frac{\sin\theta}{\lambda} = m \cdot \frac{1}{d}; \quad d\sin\theta = m\lambda$$

Grating equation, Bragg Condition

Lect. 10: Diffraction Gratings



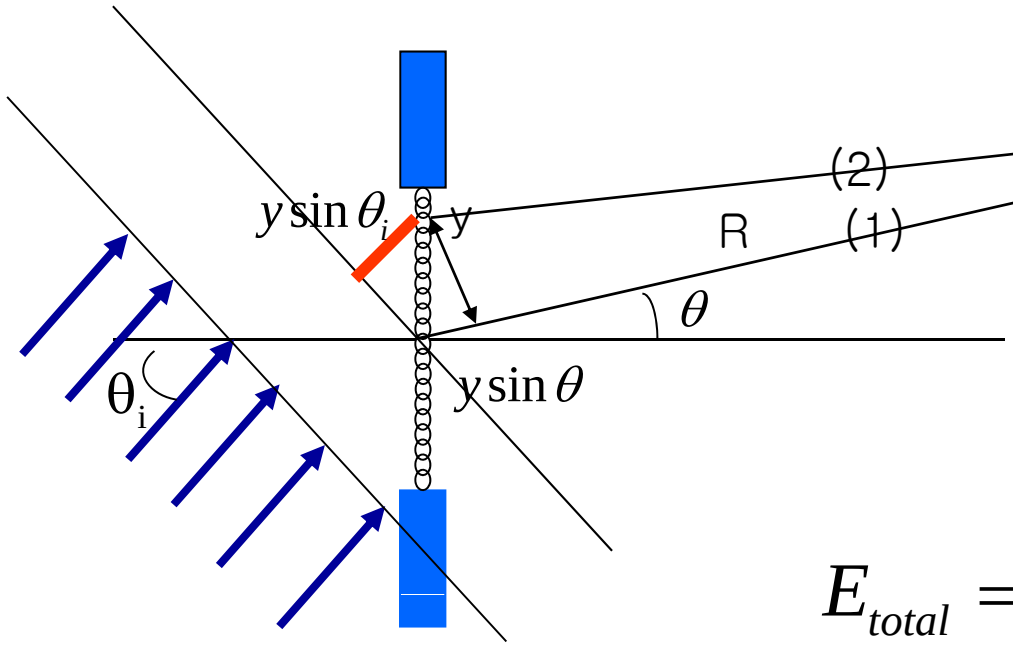


$$d \sin\theta = m\lambda$$

Width for each diffracted beam?

Lect. 10: Diffraction Gratings

Input with tilted angle



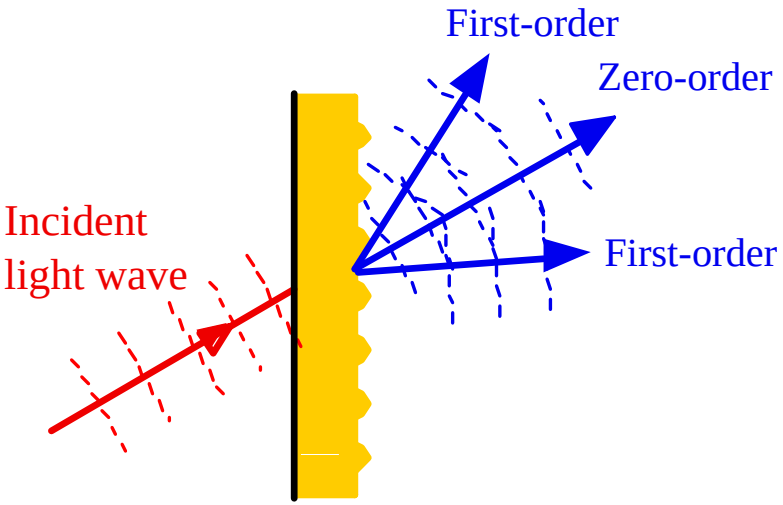
(2) $\frac{A}{R}e^{jky(\sin\theta-\sin\theta_i)}$

(1) $\frac{A}{R}$

$$E_{total}=\int_{-\infty}^{\infty}\frac{A}{R}e^{jky(\sin\theta-\sin\theta_i)}dy$$

Lect. 10: Diffraction Gratings

Tilted incidence on grating



$$d \sin\theta = m\lambda$$

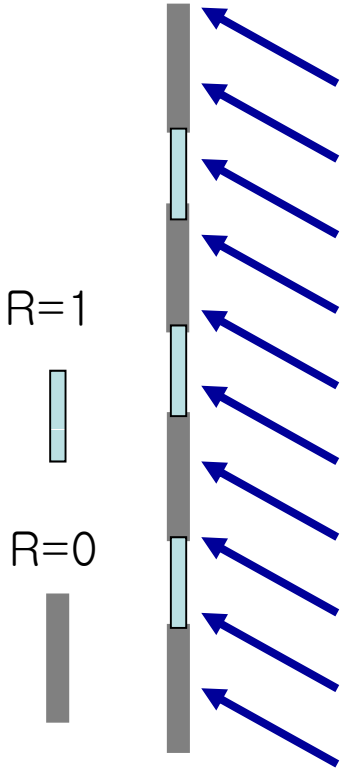
$$\rightarrow \quad d\left(\sin\theta - \sin\theta_i\right) = m \cdot \lambda$$

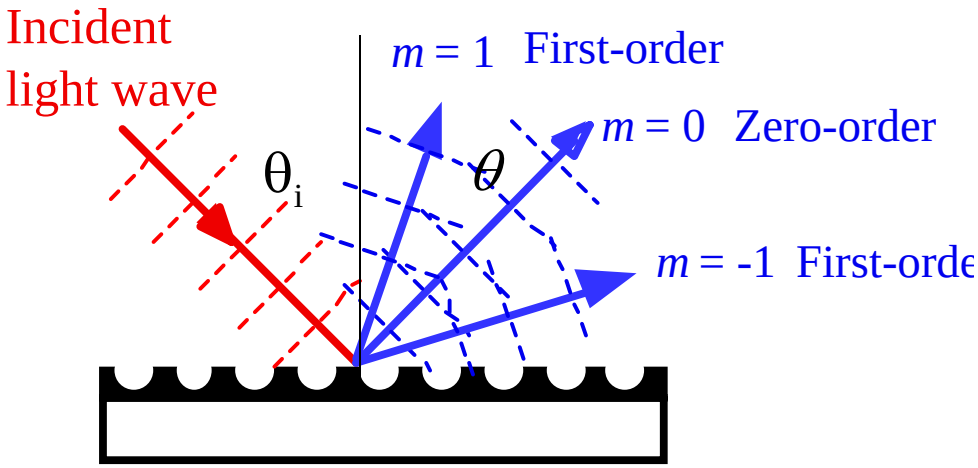
Lect. 10: Diffraction Gratings

Reflection-type grating

Same diffraction equation applies

$$d(\sin\theta - \sin\theta_i) = m \cdot \lambda$$





(b) Reflection grating

Grating can be realized as long as reflection surface is periodic

Gratings are widely used as λ demultiplexer

Lect. 10: Diffraction Gratings

Homework (Optional): Determine conditions for following two cases.