

Above the grating:

$$U_z^{(2)} = A_0^{(2)} \exp(i\alpha_0 x - i\beta_0^{(2)} y) + \dots$$

(incident)

2

Refractive index
 $\nu_2 = 1$ (vacuum)

θ_2

$\theta_{2,0}$

$n = -N$

$n = -1$

$n = 0$

$n = 1$

$n = N$

$$B_{-N}^{(2)} \exp(i\alpha_{-N} x + i\beta_{-N}^{(2)} y) + \dots +$$

$$B_{-1}^{(2)} \exp(i\alpha_{-1} x + i\beta_{-1}^{(2)} y) +$$

$$B_0^{(2)} \exp(i\alpha_0 x + i\beta_0^{(2)} y) +$$

$$B_1^{(2)} \exp(i\alpha_1 x + i\beta_1^{(2)} y) +$$

$\dots +$

$$B_N^{(2)} \exp(i\alpha_N x + i\beta_N^{(2)} y)$$

1

Refractive index ν_1
(possibly complex, lossy)

$$\alpha_0 = k_2 \sin \theta_2$$

$$\alpha_n = \alpha_0 + \frac{2\pi n}{d}$$

$\theta_{1,0}$

$n = N$

$n = 1$

$n = 0$

$n = -1$

$n = -N$

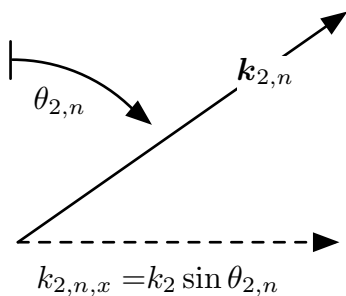
$$\dots + A_N^{(1)} \exp(i\alpha_N x + i\beta_N^{(1)} y)$$

$$A_1^{(1)} \exp(i\alpha_1 x + i\beta_1^{(1)} y) +$$

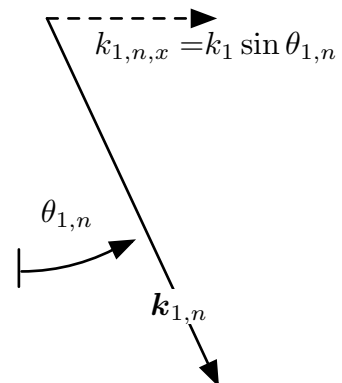
$$A_0^{(1)} \exp(i\alpha_0 x + i\beta_0^{(1)} y) +$$

$$A_{-1}^{(1)} \exp(i\alpha_{-1} x + i\beta_{-1}^{(1)} y) +$$

Inside the grating: $U_z^{(1)} = A_{-N}^{(1)} \exp(i\alpha_{-N} x + i\beta_{-N}^{(1)} y) + \dots +$



Reflected wavevectors $k_{2,n}$



Transmitted wavevectors $k_{1,n}$