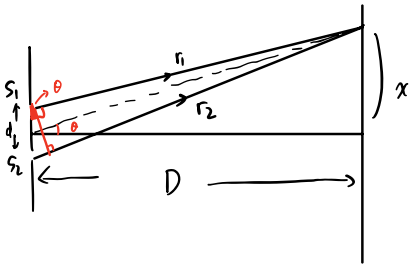
§12-2

1. 原子发射的光波是一段频率一定，振动方向一定，有限长的光波。称之为 光波列

2. 相干光：两束光振动频率相同，振动方向和相位差恒定

§12-3

1. 双缝干涉：



波程差：$\delta = r_2 - r_1$

$= d\sin\theta \approx d\theta \approx d\tan\theta$

又 $\tan\theta = \frac{x}{D}$

$\therefore \begin{cases} x = \pm k\frac{D\lambda}{d} \text{ 时} \rightarrow \text{明纹} \\ x = \pm(2k+1)\frac{D\lambda}{2d} \rightarrow \text{暗纹} \end{cases}$

2. 半波损失：从光疏 → 光密，入射角 $i \approx 0° / 90°$ 时。

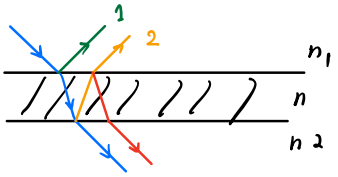
反射光相位较入射光亮 π

§12-4

1. 光程差：定义 $\delta = n \cdot x$。n 为折射率，x 为光线实际路径长

$\rightarrow$ 相位差 $\Delta\phi = \frac{2\pi\delta}{\lambda}$

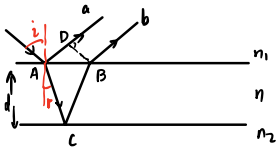
2. 反射光相位突变和附加光程差：



当有 $\begin{cases} n_1 > n \\ n_2 > n \end{cases}$ or $\begin{cases} n_1 < n \\ n_2 < n \end{cases}$ 时，

1 & 2 之间会有附加相位差 π（即附加光程差 $\frac{\lambda}{2}$）

例：



求 a、b 光程差。

$\delta = n(AC+CB) - n_1 AD$

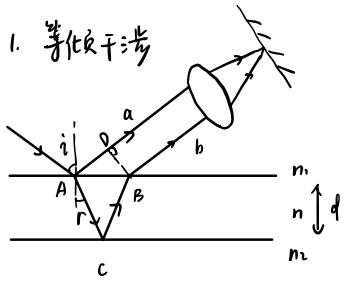
$\Rightarrow \delta_1 = 2d\sqrt{n^2 - n_1^2\sin^2 i}$

但又有附加光程差 $\frac{\lambda}{2}$

$\rightarrow \delta = 2d\sqrt{n^2 - n_1^2\sin^2 i} + \frac{\lambda}{2}$

§12-5

1. 等倾干涉



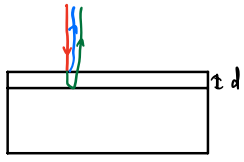
由前可知 $\delta = 2d\sqrt{n^2 - n_1^2\sin^2 i} + \frac{\lambda}{2}$

当 $\delta = k\lambda$ 产生明条纹

$\frac{(2k+1)}{2}\lambda$ 产生暗条纹

中间亮，外部稀疏。

2. 增透膜：减少反射光

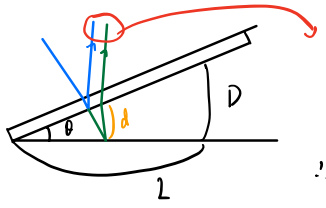


利用 ↑↑ 抵消。

$\rightarrow$ 光程差为 $(k+\frac{1}{2})\lambda$。

$2nd = (k+\frac{1}{2})\lambda \Rightarrow d_{min} = \frac{\lambda}{4n}$

3. 增反膜：

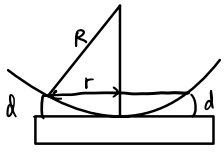


产生干涉。当光线垂直入射时近似成立

$\delta = 2d + \frac{\lambda}{2}$

$\therefore l\sin\theta = \frac{\lambda}{2} \simeq l\frac{D}{L}$

牛顿环



$r^2 = R^2 - (R-d)^2 = 2Rd - d^2$ ($R \gg d$)

$\approx 2Rd$

$\therefore d = \frac{r^2}{2R}$ 而 $\begin{cases} \text{明：} 2d + \frac{\lambda}{2} = k\lambda \\ \text{暗：} 2d + \frac{\lambda}{2} = (k+\frac{1}{2})\lambda \end{cases}$

$\Rightarrow \begin{cases} \text{明环半径：} r = \sqrt{\frac{(2k-1)R\lambda}{2}} \\ \text{暗环……：} r = \sqrt{kR\lambda} \end{cases}$