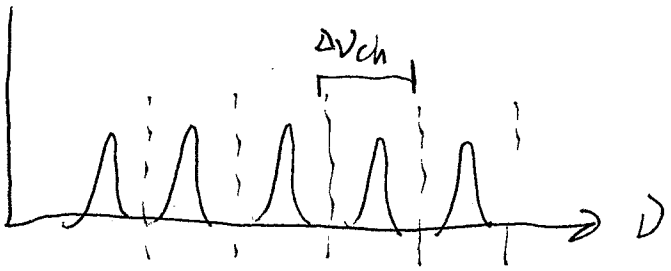
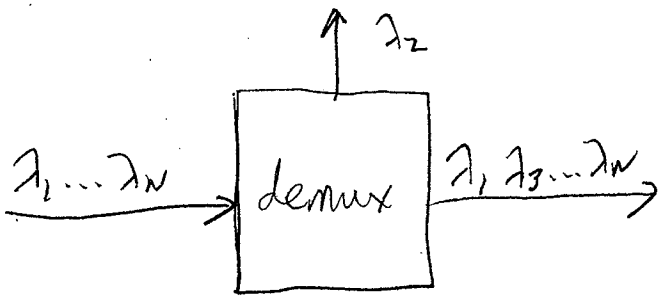
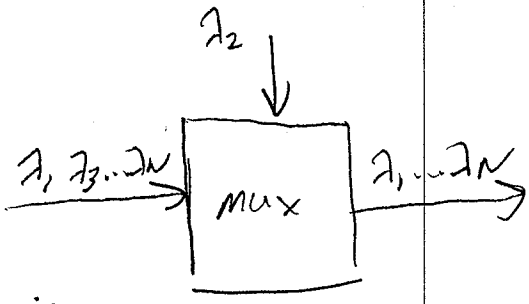
Waveguide gratings

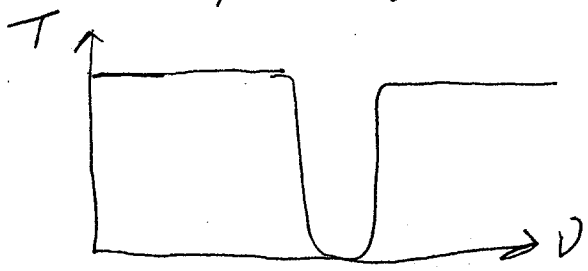
WDM communications
- 48-96 channels
- 100 GHz - 50 GHz spacing
- 2.5 to 10 Gb/s per channel

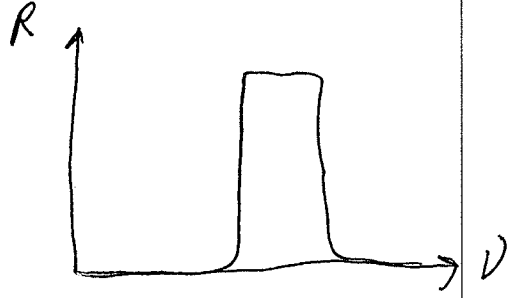






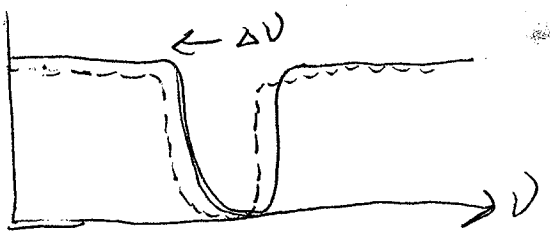
need to implement filter - notch filter



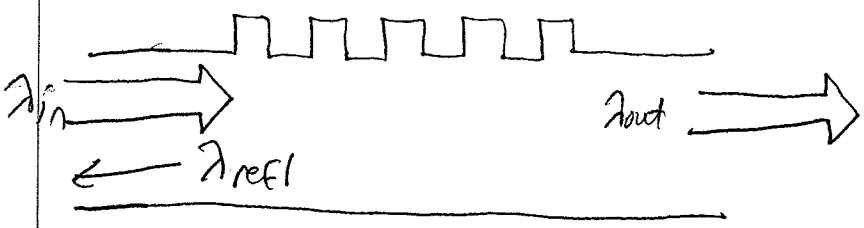


sensors

stress, strain, temp., molecule



Bragg grating



$$\frac{dA^+}{dz} = KA^- e^{j\delta z}$$

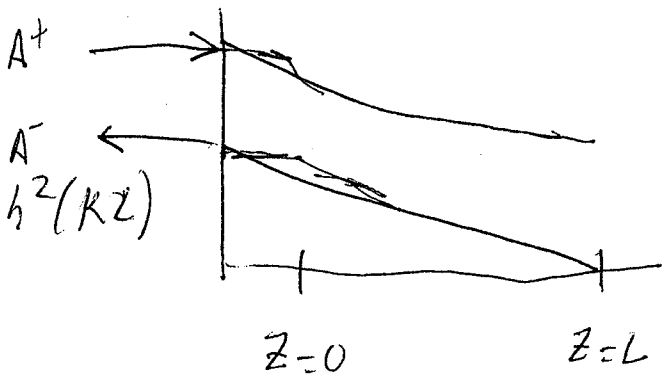
$$\frac{dA^-}{dz} = KA^+ e^{-j\delta z}$$

$\delta = 2\beta - 2\pi/\Lambda$

if $\delta = 0$, then $A^-(z) = A^+(0)\dfrac{\sinh[K(z-L)]}{\cosh(KL)}$

$A^+(z) = A^+(0)\dfrac{\cosh[K(z-L)]}{\cosh(KL)}$

$$R = \frac{|A^-(0)|^2}{|A^+(0)|^2} = \left|\frac{\sinh(KL)}{\cosh(KL)}\right|^2 = \tanh^2(KL)$$



for $\delta \neq 0$

~~$\gamma = \pm j\sqrt{K^2 - (\delta/2)^2}$~~ $\alpha = \sqrt{K^2 - (\delta/2)^2}$ $1 = \left(\frac{K}{\alpha}\right)^2 = 1 - \left(\frac{\delta}{2K}\right)^2$

$$\left|\frac{A^+(z)}{A^+(0)}\right|^2 = \frac{1 + F\sinh^2[\alpha(z-L)]}{1 + F\sinh^2(\alpha L)}$$

$$\left|\frac{A^-(z)}{A^+(0)}\right|^2 = \frac{F\sinh^2[\alpha(z-L)]}{1 + F\sinh^2(\alpha L)}$$

~~$(\sinh^2 + \cosh^2 = 1)$~~ $\cosh^2 = 1 + \sinh^2$