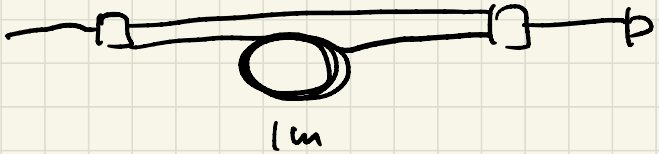
1m mismatch

$\nu = \nu_0 + \Delta\nu$

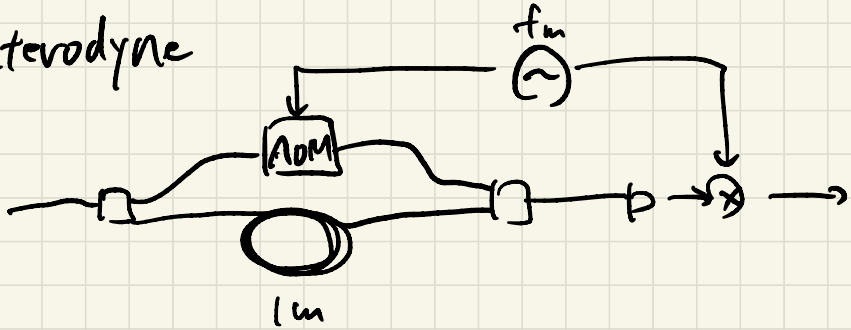
$\Delta l = 1m$

$\delta\phi = 2\pi\nu \cdot \frac{\Delta l}{c}$

$\tau = \frac{\Delta l}{c}$



heterodyne



$$E_{out} = \frac{E_0}{\sqrt{2}} e^{2\pi i(\nu_0+\Delta\nu+f_m)t} + \frac{E_0}{\sqrt{2}} e^{2\pi i(\nu_0+\Delta\nu)(t-\tau)}$$

$$= \frac{E_0}{\sqrt{2}} e^{2\pi i(\nu_0+\Delta\nu)t} \left(e^{2\pi i f_m t} + e^{-2\pi i(\nu_0+\Delta\nu)\tau} \right)$$

$$= \frac{E_0}{\sqrt{2}} e^{2\pi i(\nu_0+\Delta\nu)t + 2\pi i f_m t} \left(1 + e^{-2\pi i(\nu_0+\Delta\nu)\tau - 2\pi i f_m t} \right)$$

$$P_{out} = P_0 \left(1 - \cos\left[-2\pi(\nu_0+\Delta\nu)\tau - 2\pi i f_m t \right] \right)$$

demod →

$P_c = \cos 2\pi(\nu_0+\Delta\nu)\tau$

$P_s = -\sin 2\pi(\nu_0+\Delta\nu)\tau$

適当な quadrature と

$\propto 2\pi(\nu_0+\Delta\nu)\tau$ $\delta\phi$

$$\delta\phi = 2\pi\Delta\nu\tau = 2\pi\frac{\Delta l}{c}\Delta\nu = 2\pi\frac{\Delta l}{\lambda}\frac{\Delta\nu}{\nu}$$