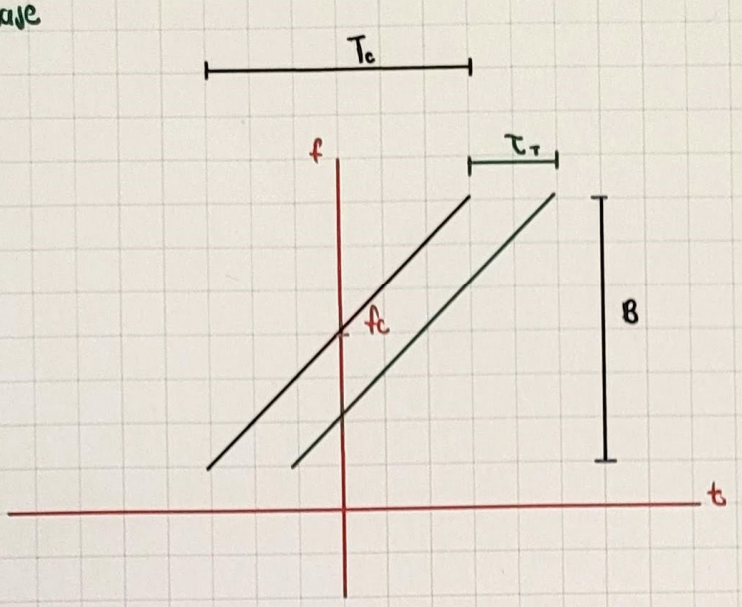
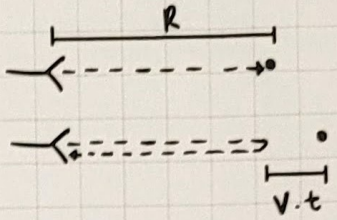
Target case



$$\mu = \frac{B}{T_c}$$

$$\tau_T = \frac{2}{c}(R + V \cdot t)$$



$$f(t) = f_c + \mu t \quad \text{with} \quad t \in [-T/2,\ T/2]$$

★ Transmitted signal ⊥: $A_1 \cos(\varphi_1(t))$

Task-1 find $\varphi_1(t) = 2\pi \int_{-T/2}^{t} f_1(t)\, dt$

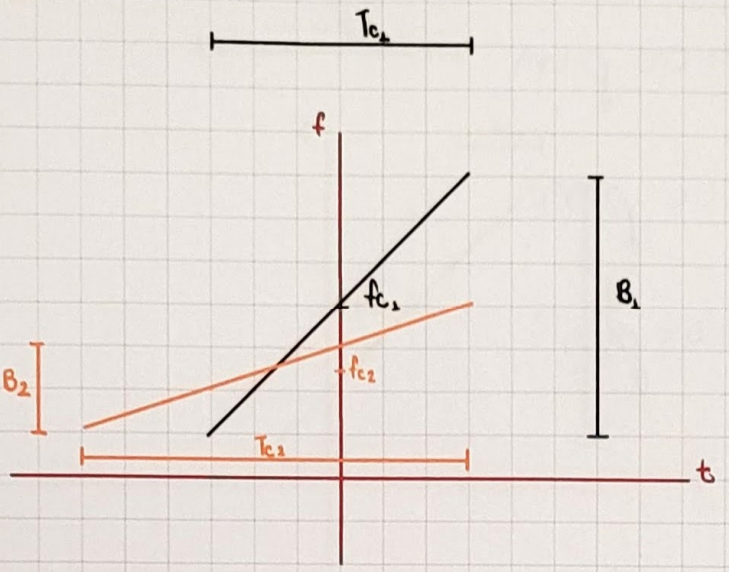
Received backscattered signal: $A_1' \cos(\varphi_1'(t))$ with $\varphi_1'(t) = \varphi_1(t - \tau_T)$

find $\varphi_1'(t)$

IF signal (due to Target): $A_1 \cos(\varphi_1(t)) \cdot A_1' \cos(\varphi_1'(t)) \overset{LPF}{=} \frac{A_1 A_1'}{2} \cos(\underbrace{\varphi_1(t) - \varphi_1'(t)}_{\Delta\varphi_T})$

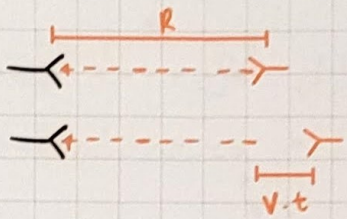
find $\Delta\varphi_T(t)$

Interferer Case



$$\mu_1 = \frac{B_1}{T_{c_1}} \qquad \mu_2 = \frac{B_2}{T_{c_2}}$$

$$\tau_I = \frac{1}{c}(R + V \cdot t)$$



$$f(t) = f_c + \mu t \qquad \text{with} \quad t \in [-T/2,\ T/2]$$

* Transmitted signal 2 : $A_2 \cos(\varphi_2(t))$

Signal after τ_I : $A_2' \cos(\varphi_2'(t))$ with $\varphi_2'(t) = \varphi_2(t - \tau_I)$

IF signal (due to interf) $A_1 \cos(\varphi_1(t)) \cdot A_2' \cos(\varphi_2'(t)) \overset{LPF}{=} \frac{A_1 A_2'}{2} \cos(\underbrace{\varphi_1(t) - \varphi_2'(t)}_{\Delta\varphi_I})$

find $\Delta\varphi_I(t)$ in terms of $2\pi(at^2 + bt + c)$

Simulate $A_I \cos(\Delta\varphi_I(t))$ and verify the effects of having different R, f_c, μ ...