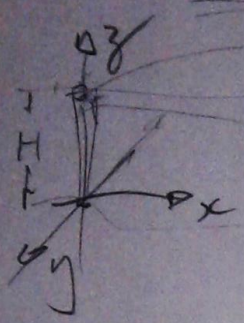
total mass cross-section

$$C = C_{bg} + \frac{M}{2\pi\sigma_y\sigma_z} e^{\left(-y^2/2\sigma_y^2\right)} e^{\left(-\frac{z-H}{2\sigma_z^2}\right)} = \frac{E}{2\pi U\sigma_y\sigma_z} e^{(\cdot)} e^{(\cdot)}$$

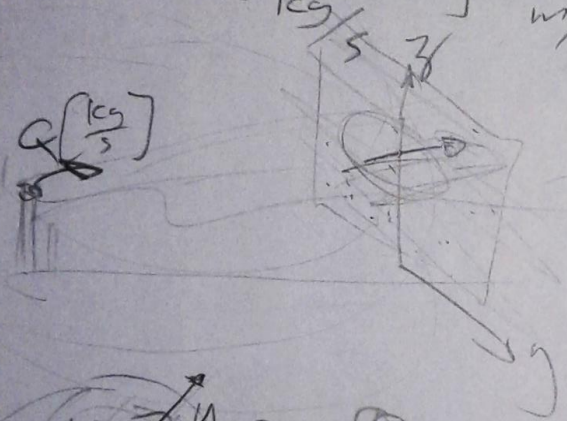


$$M = \int C(x,y,z)\,dy\,dz$$

$$C(x, y=0, z=0)$$

(Wind Direction)

$$\underset{kg/s}{Q\ (\text{or } E)} = \int \underset{m/s}{U(z)}\, \underset{kg/m^3}{C(x,y,z)}\, \underset{m}{dy}\, \underset{m}{dz}$$

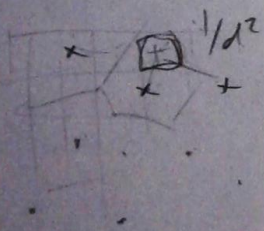


$$Q = \bar{U} \overbrace{\int C(x,y,z)\,dy\,dz}^{M}$$

$$\left(\frac{kg}{m}\right) M = \frac{Q\,[kg/s]}{\bar{U}\,[m/s]}$$

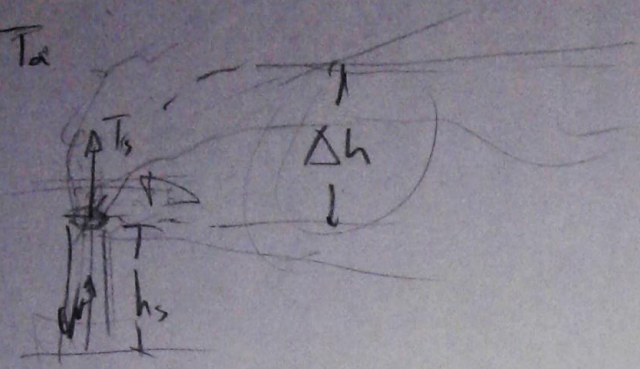
$$\frac{dC}{dt} \qquad \frac{dC}{dt} = \oint U C\, dS$$

$$\underset{\text{advective}}{\underset{kg/m^2/s}{F(y,z)}} = \underset{kg/m^2}{C(y,z)} \cdot \underset{m/s^2}{U(z)}$$



$$Q = \int F\,dy\,dz = \int U \cdot C\,dy\,dz$$

I.D.W.



$$\overset{m^4/s^2}{F_M} = \left(\frac{\rho_s}{\rho}\right) \overset{m^2}{r_s^2}\, \overset{m^2/s^2}{w_s^2}$$

$$F_B = \left(1 - \frac{\rho_s}{\rho}\right) \underset{m/s^2}{g}\, \underset{m^2}{r_s^2}\, \underset{m/s}{w_s}$$

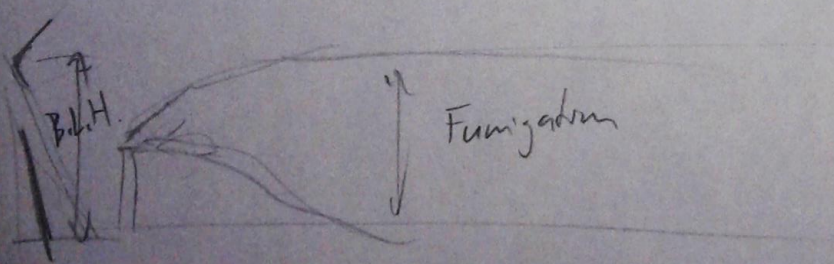
$$\left[\frac{1}{s^2}\right] s = \frac{g}{T}\frac{d\theta}{dz}\left[\frac{m/s^2}{K} + \frac{K}{m}\right], \quad \cancel{u\,[m/s]}, \quad t\,[s], \quad \Delta z\,[m]$$

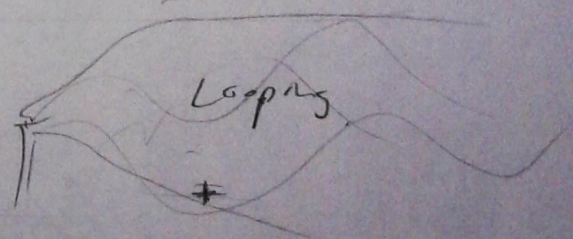
$$\Delta z \to \Delta h$$

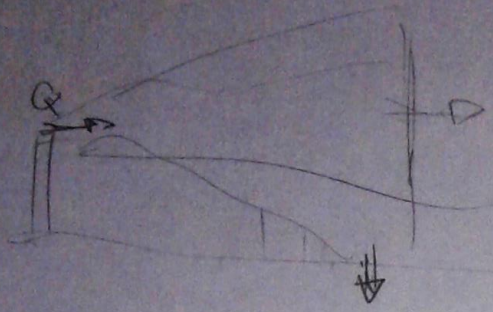
α_1	F_B	$[m^4/s^3]$	$L^4 T^{-3}$	$4\alpha_1 + \alpha_3 = 0$
α_2	s	$[1/s^2]$	T^{-2}	$-3\alpha_1 - 2\alpha_2 = 0 \Rightarrow \alpha_2 = -\frac{3}{2}\alpha_1$
α_3	Δh	$[m]$	L	$\alpha_3 = 1$, $\alpha_1 = -1/4$, $\alpha_2 = \frac{3}{8}$

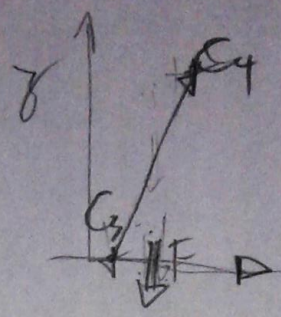
$$\Pi = F_B^{-1/4}\, s^{3/8}\, \Delta h$$

$$\Delta h = \Pi\, F_B^{1/4}\, s^{-3/8} = \underline{\underline{\Pi}} \left(\frac{F_B^2}{s^3}\right)^{1/8}$$









$$F = -K\frac{dC}{dz}$$

$\frac{kg}{m^2 s}$

$$K = \kappa u_* z \qquad F = -\kappa u_* z \frac{dC}{dz}$$

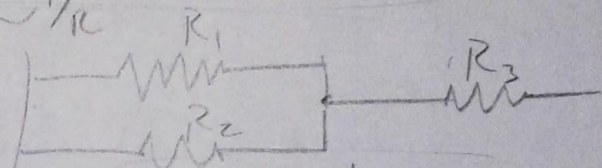
$$\int_{z=0}^{z} \frac{dz\,F}{\kappa u_* z} = -\int_{C_0}^{C} dC$$

$$\left[\frac{kg}{m^2 s}\right] F = \frac{\kappa u_*}{\ln(z/z_0)}(C - C_0) = -\frac{\Delta C}{R}\left[\frac{s}{m}\right]$$

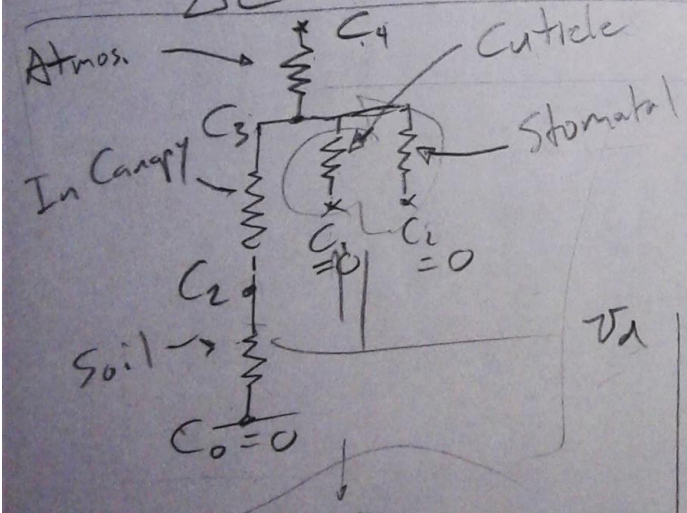
$1/R$

Ohm's $V = IR$

voltage ΔC $\quad I \to F \quad R \to \frac{\ln(z/z_0)}{\kappa u_*}$

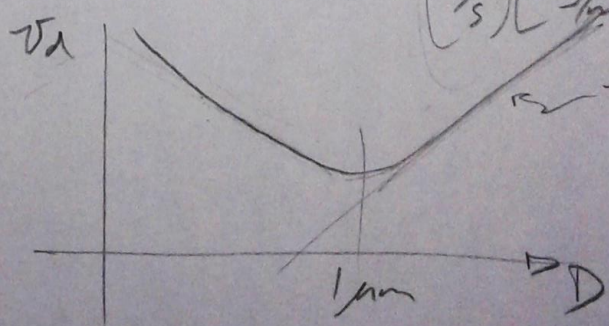


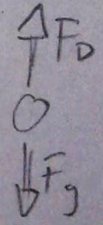
$$\left(\frac{1}{R_1 + R_2}\right)^{-1} + R_3$$

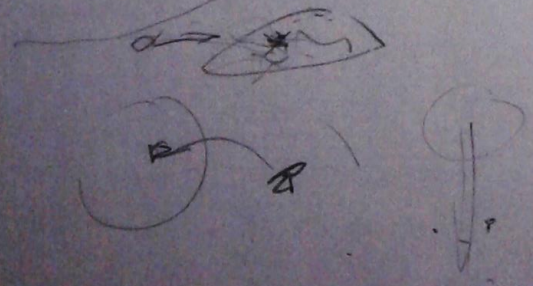


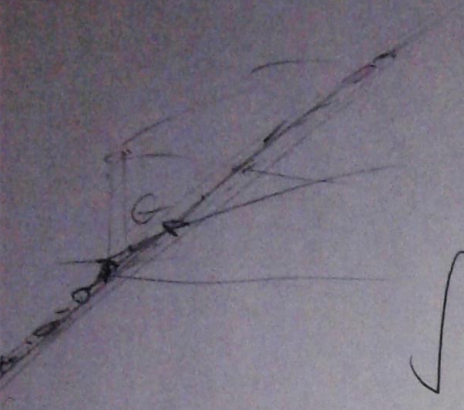
$$F = -\frac{\Delta C}{R} = -v\Delta C$$

$\left(\frac{m}{s}\right)\left(\frac{kg}{m^3}\right)$





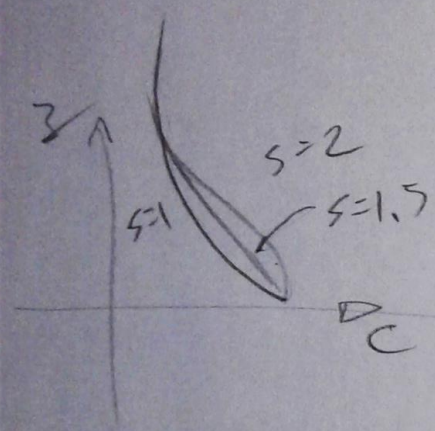




$$C = C_{by} + \frac{M}{2\pi\sigma_y\sigma_z}\exp\left(-\frac{y^2}{2\sigma_y^2}\right)\exp\left(-\frac{z^2}{2\sigma_z^2}\right)$$

$$\int C\,dy = -''- \quad -''- \int \exp\left(-\frac{y^2}{2\sigma_y^2}\right)dy$$

$$= \frac{\sqrt{2\pi}\,\sigma_y}{2\pi\sigma_y\sigma_z}\exp\left(-\frac{z^2}{2\sigma_z^2}\right)$$

$$= \frac{1}{\sqrt{2\pi}\,\sigma_z}\exp\left(-\frac{z^2}{2\sigma_z^2}\right)$$

$\sigma_z = f(x)$