ESRI World File

image .TIF

reg. info .TFW →

GSD_x	2
	0
	0
$-GSD_y$	−2
U.L. x	XXX.XX
U.L. Y	YYY.YY

LS: estimation $\Delta = (B^T W B)^{-1} B^T W f$

error propagation (Δ: unknowns; $(B^T W B)^{-1}$: N; $B^T W f$: t)

$$\Delta = N^{-1} t$$

N^{-1}: $Q_{\Delta\Delta}$ Scaled version

$\Sigma_{\Delta\Delta}$

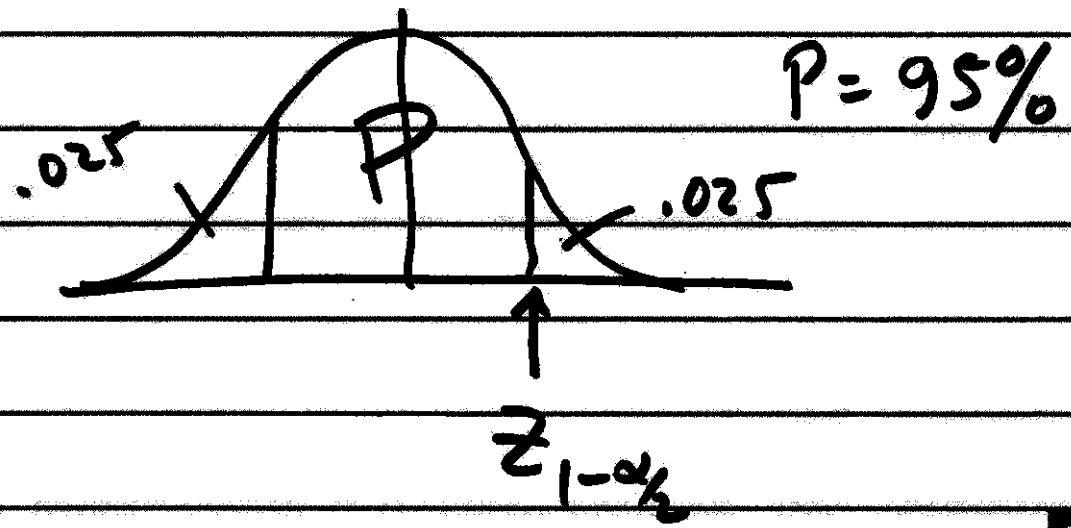
$$\Sigma_{\Delta\Delta} = \sigma_0^2 Q_{\Delta\Delta}$$

$$W = \begin{bmatrix} w_1 & & \\ & w_2 & \\ & & \ddots \\ & & & w_n \end{bmatrix} = \begin{bmatrix} \sigma_0^2/\sigma_1^2 & & & \\ & \sigma_0^2/\sigma_2^2 & & \\ & & \ddots & \\ & & & \sigma_0^2/\sigma_n^2 \end{bmatrix}$$

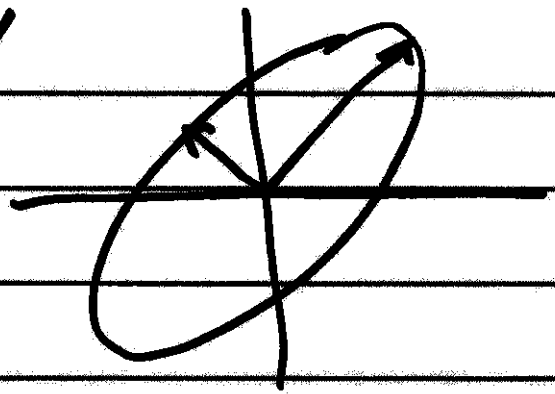
$$\Sigma_{\Delta 0} = \begin{bmatrix} \begin{bmatrix} \sigma_{x_1}^2 & \sigma_{x_1 x_1} & - \\ & \sigma_{y_1}^2 & - \\ & & \sigma_{z_1}^2 \end{bmatrix} & \begin{bmatrix} \sigma_{x_2}^2 & \sigma_{x_2 x_1} & \sigma_{x_2 z_1} \\ & \sigma_{y_2}^2 & \sigma_{y_2 z_1} \\ & & \sigma_{z_2}^2 \end{bmatrix} & \\ & & \end{bmatrix}$$

Confidence interval for 1 parameter

$$\hat{X}_1 \pm Z_{1-\alpha/2}\,\sigma_{X_1}$$



$\hat{x}, \hat{y}$



directions →

↖↗ : eigenvectors of Σ

$$\Sigma = \begin{bmatrix} \sigma_x^2 & \sigma_{xy} \\ \sigma_{xy} & \sigma_y^2 \end{bmatrix}$$

$$eig(S) : \begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix} \begin{bmatrix} v_1 & v_2 \end{bmatrix}$$

magnitude : semi-major $\sqrt{\lambda_1 \chi^2_{p,2}}$

semi-minor $\sqrt{\lambda_2 \chi^2_{p,2}}$

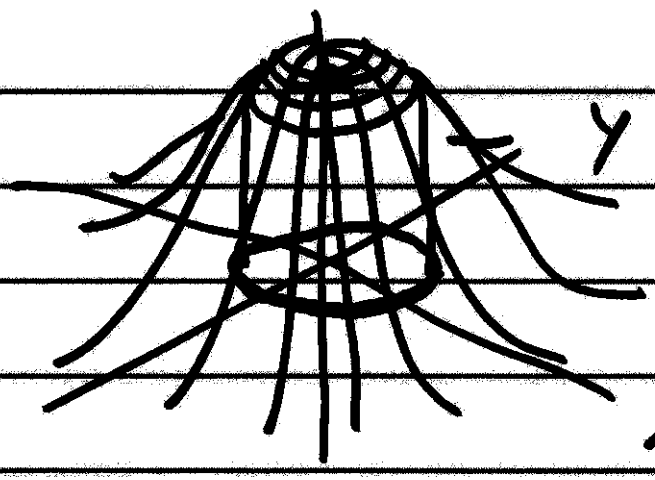
CE, CE90, CE95, ...

Circular Error

n: # elements in Vector

~~E(x)~~

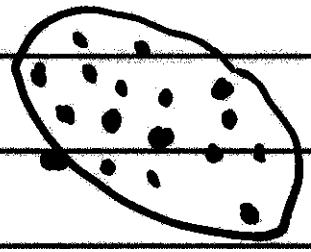
$$f(x) = \frac{1}{(2\pi)^{n/2}\sqrt{|\Sigma|}} \cdot \exp\left[-\tfrac{1}{2}(x-\mu_x)^T \Sigma^{-1}(x-\mu_x)\right]$$

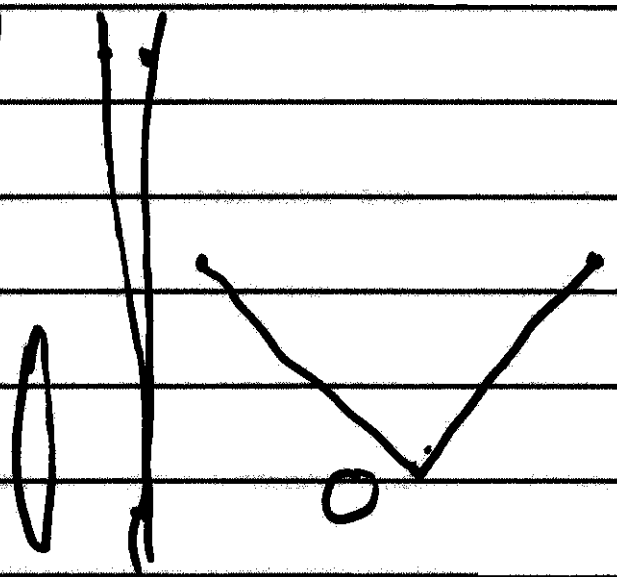


expand cylinder until volume = P

When you compute a quantity,
not final answer

it is a sample





need to acknowledge

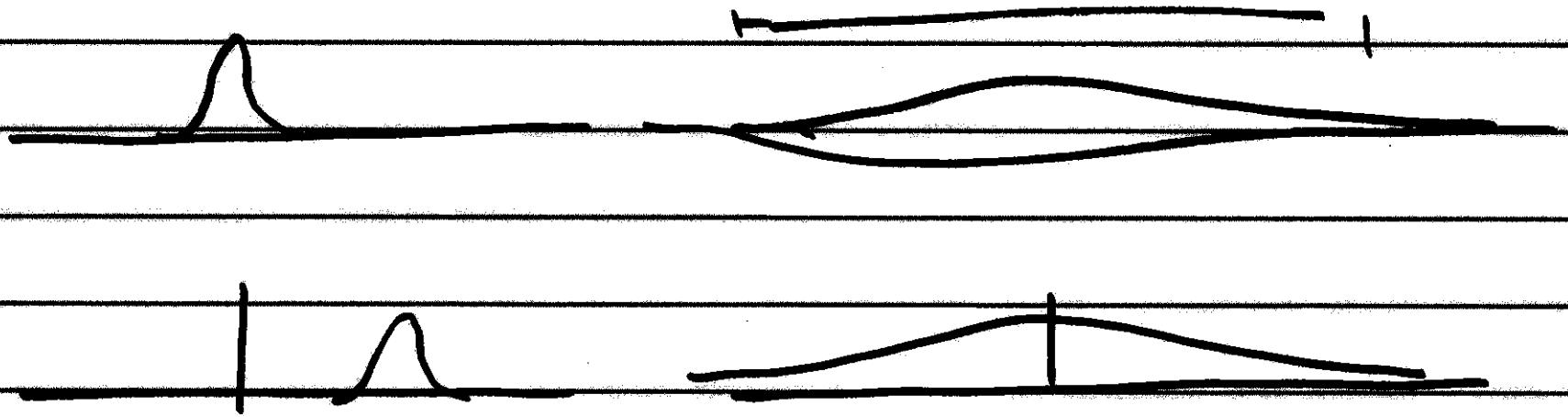
- spread
- dispersion
- variability
- uncertainty

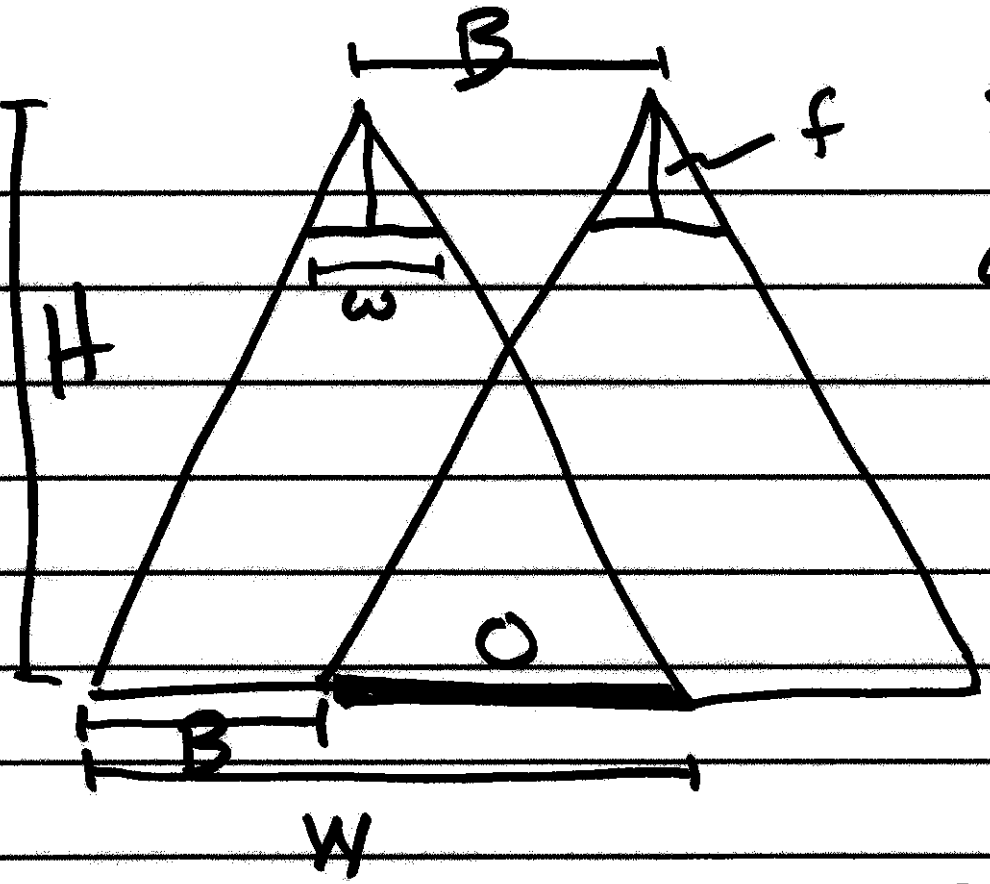
to improve: increase redundancy
geometric strength

quality: precision (Σ)

accuracy / reliability

absolute discrepancy





Scale: $\frac{w}{W}$

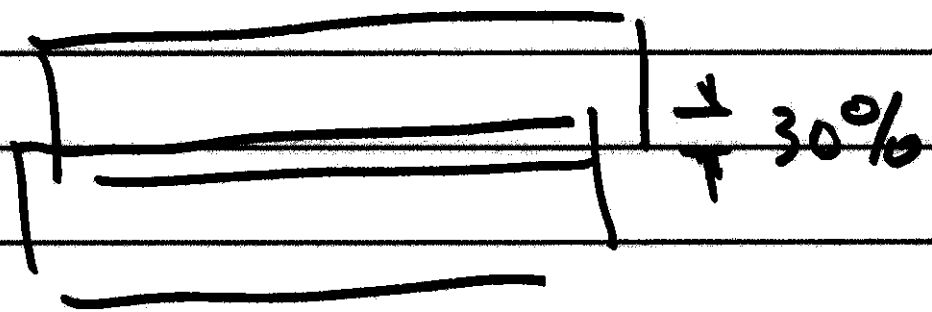
overlap fraction

R: $\frac{O}{W} = 1 - \frac{B}{W}$

R: 0.6 : 60%

forward overlap

side overlap: 0.3 30%



$d = vt$

$t = \frac{d}{v}$

d: Base

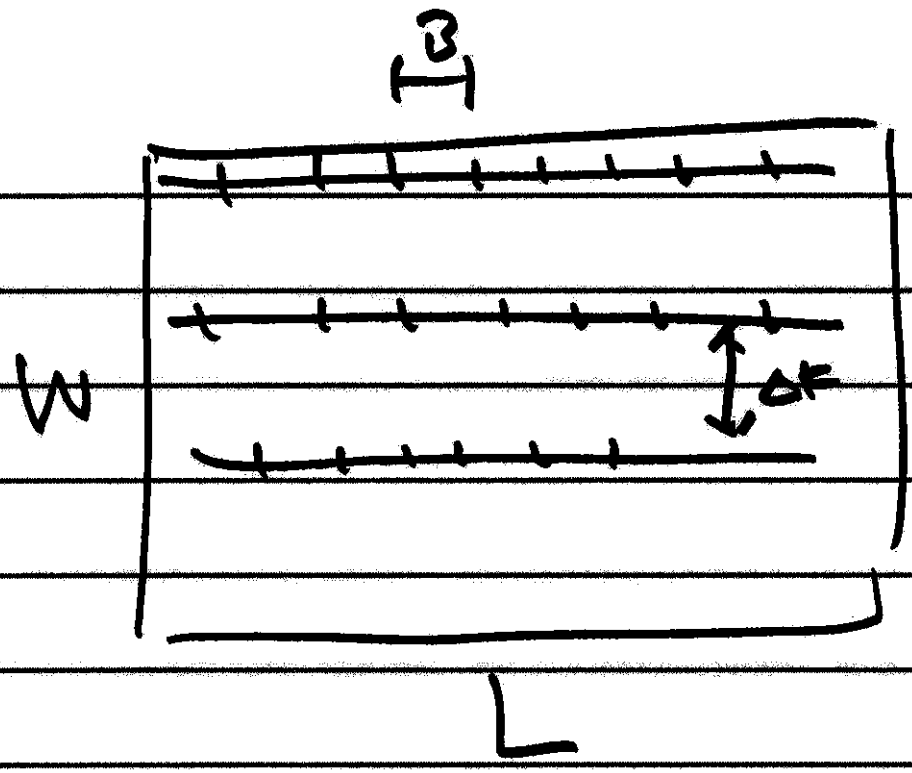
v: aircraft velocity

t: time interval between exposures

$R = 1 - \frac{B}{W}$

$\boxed{B = W(1 - R_f)}$ forward

$\boxed{\Delta F = W(1 - R_s)}$ side

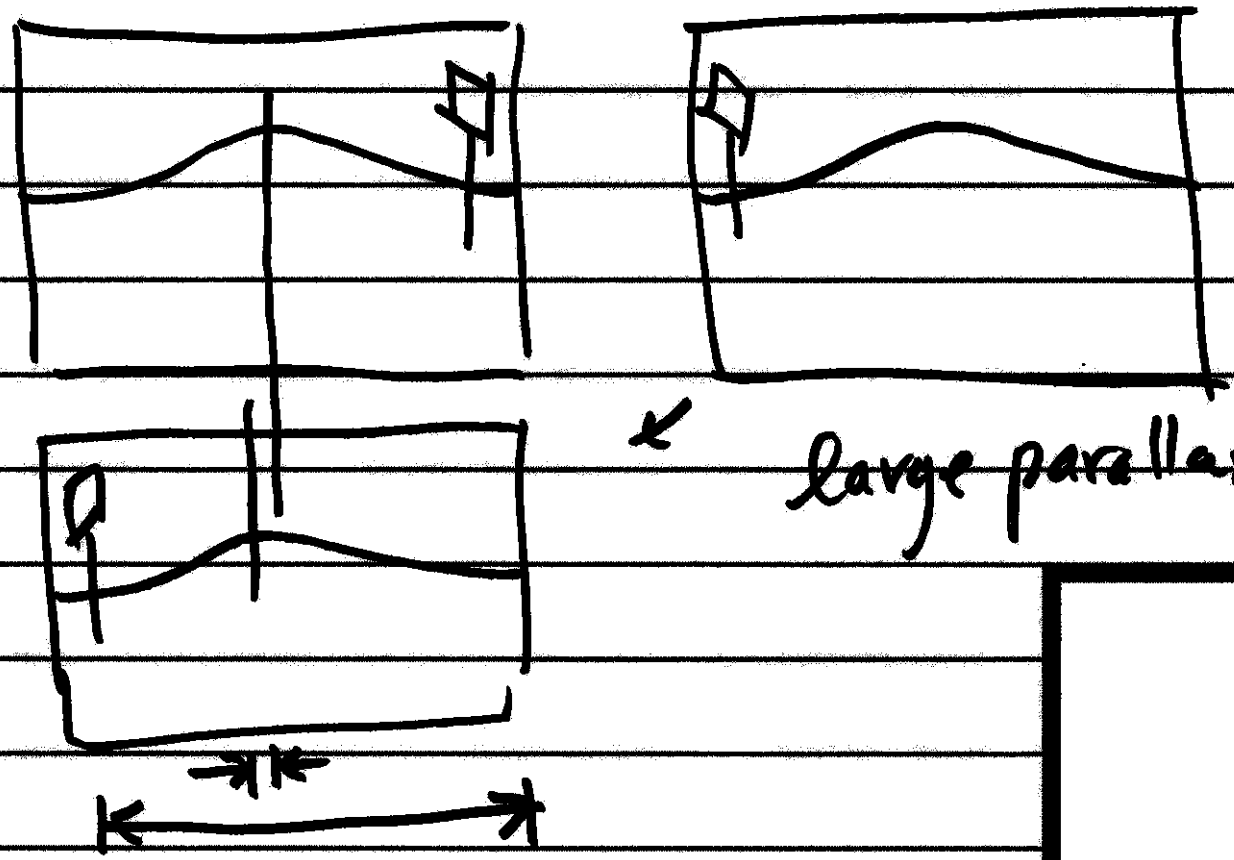


$\#\text{exp} \approx L/B + 1$

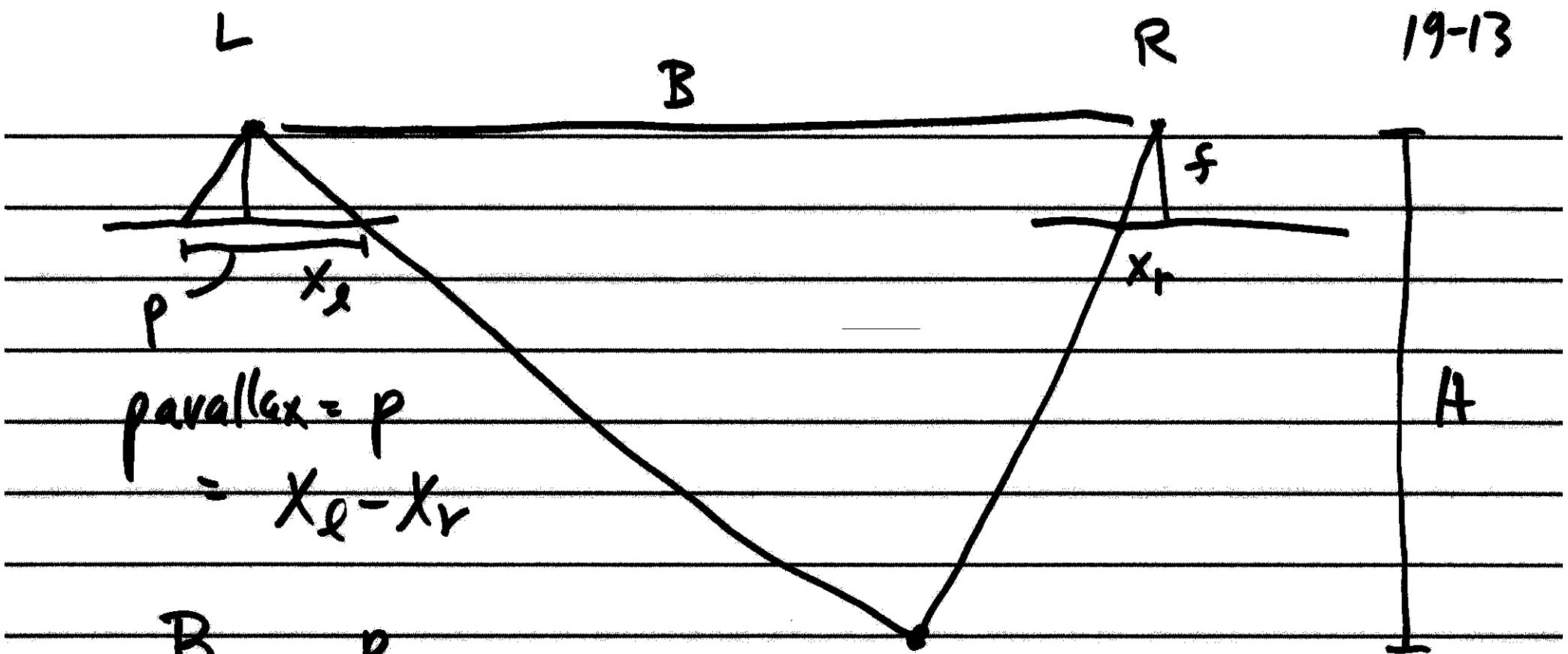
$\#\text{flight lines} \approx W/\Delta F + 1$

project planning

Parallax: apparent change in position of object due to change in view location (disparity)



large parallax: near by range



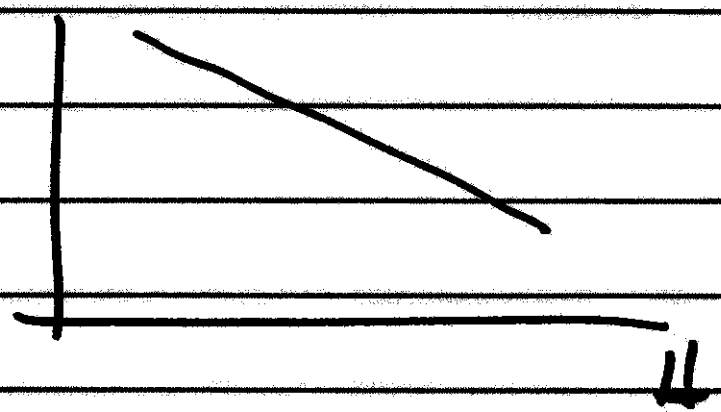
$$\text{parallax} = p = x_l - x_r$$

$$\frac{B}{H} = \frac{p}{f}$$

$$\boxed{H = \frac{B}{p} f}$$

H: range $\sim \frac{1}{p}$

$$\frac{dp}{dH} \cdots -\left(\frac{F}{H}\right)\frac{B}{H} = -\text{scale} \cdot \frac{B}{H}$$



$\frac{B}{H}$: photographs 0.6

$\frac{b}{h}$: visual system 0.15