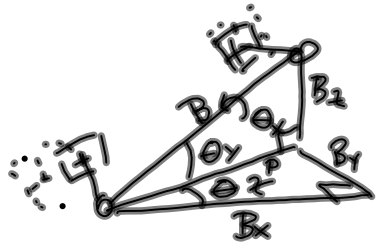
17-1



$P = \sqrt{B_x^2 + B_y^2}$

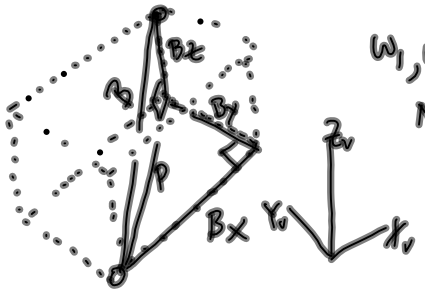
$\theta_z = \tan^{-1} B_y / B_x$

$\theta_y = \tan^{-1}\left(\frac{-B_z}{P}\right)$

$\theta_x = \frac{w_1 + w_2}{2}$

w_1, w_2: tertiary

$M = M_\omega M_\varphi M_\kappa$



math for pairwise rectification

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17-2

$M_B = M_x(\theta_x)\, M_y(\theta_y)\, M_z(\theta_z)$

$X_N = M_B X_v$ ← reference system

normalized system

$X_{p_i} = M_i X_v \quad i = 1,2$

$X_v = M_i^T X_{p_i}$

$\checkmark$ $X_N = M_B M_i^T X_{p_i}$

normalized photo

$X_{p_i} = M_i M_B^T X_N$

$X_N = M_B M_1^T X_{p_1}$
$X_N = M_B M_2^T X_{p_2}$ } extents

$X_{p_1} = M_1 M_B^T X_N$
$X_{p_2} = M_2 M_B^T X_N$ } resample image

X_N : normalized ref. frame

X_v : reference coord. system

X_p : photo coord. system (1,2)

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Resample image 1 & 2
1 (left) only R
2 (right) GB

17-3

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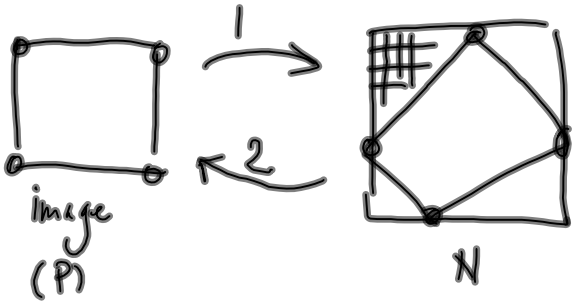

17-4

(1) $\begin{pmatrix} x_n \\ y_n \\ -f \end{pmatrix} \cdot \lambda X_N = \underbrace{M_B M_1^T \begin{pmatrix} x_{p_1} \\ y_p \\ -f \end{pmatrix}}_{u_1 v_1 w_1}$

$x_{n_1} = -f \frac{u_1}{w_1}$
$y_n = -f \frac{v_1}{w_1}$

1 : get extents or limits
2. resample for rectification

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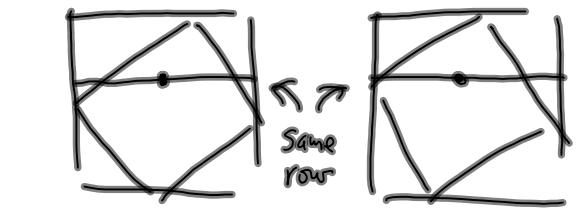
17.5



for conjugate points

epi-polar geometry yields same row for conjugate points.

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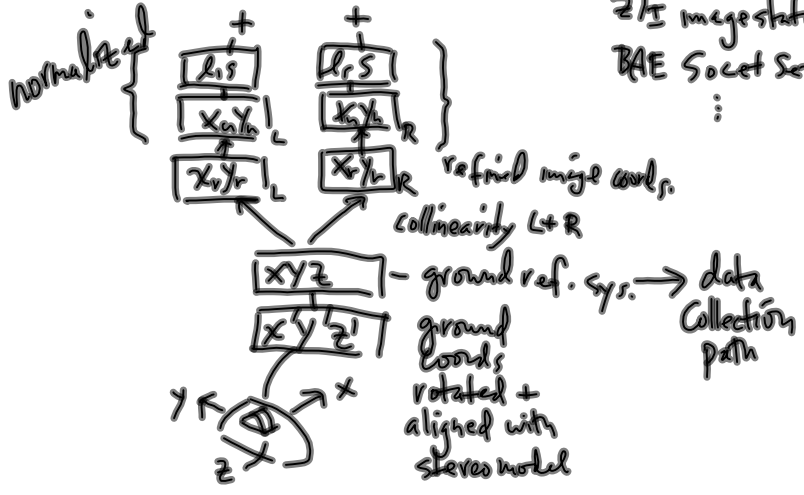
17.6

Stereo Workstation

Leica LPS
ZI imagestation
BAE Socet Set
⋮



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17-7

Parallax: apparent change in location of object caused by change in location of viewer.

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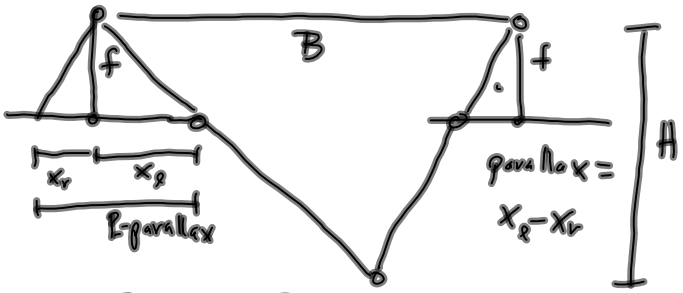
17-8



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

$$p = \frac{B}{H} f, \quad \frac{dp}{dH} = -\frac{fB}{H^2} = -\left(\frac{f}{H}\right)\left(\frac{B}{H}\right)$$

$$\frac{dp}{dH} = -\text{scale}(B/H)$$

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if $B/H \approx b/h$ scene looks normal 17-9

$B/H > b/h$ perceive depth exaggeration

0.6 typical for aerial imagery

0.15 typical individual eye base

Vertical exaggeration $\frac{B/H}{b/h}$

V.E. = 4

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typical Stereo Workstation depth appears "stretched" 17-10

Vertical exaggeration

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