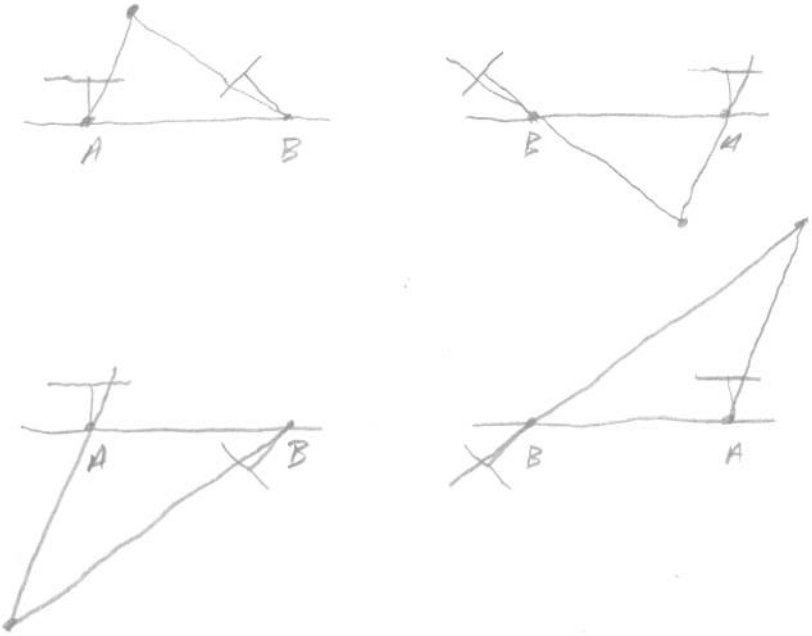
DECOMPOSE ESSENTIAL MATRIX

$\hat{P} = [I \mid 0]$ AND $\hat{P}' = [R \mid t]$ — NEED ONE 2D POINT CORRESPONDENCE

FOUR SOLUTIONS, BUT ONLY ONE WHERE RECONSTRUCTED POINT IS IN FRONT OF BOTH CAMERAS

(FROM PAGE 260 IN H&Z)



$E = U D V^T$ WHERE $diag(D) = (1, 1, 0)^T$ TO SCALE

TWO POSSIBLE CHOICES OF R

$R_1 = U W V^T$ OR $R_2 = U W^T V^T$ WHERE $W = \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

IF $det(R_1) < 0$, $R_1 = -R_1$
IF $det(R_2) < 0$, $R_2 = -R_2$

TWO POSSIBLE CHOICES OF t

$t_1 = u_3$ (THE LAST COLUMN OF U) OR $t_2 = -t_1$

FOUR SOLUTIONS

$\hat{P} = [R_1 \mid t_1]$
$\hat{P} = [R_1 \mid t_2]$
$\hat{P} = [R_2 \mid t_1]$
$\hat{P} = [R_2 \mid t_2]$

FOR EACH, PERFORM TRIANGULATION FROM 2D POINT CORRESPONDENCES. CHOOSE THE COMBINATION WHERE THE RECONSTRUCTED 3D POINT IS IN FRONT OF BOTH CAMERAS