Computing Depth: Least Squares Solution

$$\begin{bmatrix} u_r m_{31} - m_{11} & u_r m_{32} - m_{12} & u_r m_{33} - m_{13} \\ v_r m_{31} - m_{21} & v_r m_{32} - m_{22} & v_r m_{33} - m_{23} \\ u_l p_{31} - p_{11} & u_l p_{32} - p_{12} & u_l p_{33} - p_{13} \\ v_l p_{31} - p_{21} & v_l p_{32} - p_{22} & v_l p_{33} - p_{23} \end{bmatrix} \begin{bmatrix} x_r \\ y_r \\ z_r \end{bmatrix} = \begin{bmatrix} m_{14} - u_r m_{34} \\ m_{24} - v_r m_{34} \\ p_{14} - u_l p_{34} \\ p_{24} - v_l p_{34} \end{bmatrix}$$

$A_{4\times3}$ (Known) $\quad \mathbf{x}_{\boldsymbol{r}}$ (Unknown) $\quad \mathbf{b}_{4\times1}$ (Known)

Find least squares solution using pseudo-inverse:

$$A\mathbf{x}_{\boldsymbol{r}} = \mathbf{b}$$

$$A^T A\mathbf{x}_{\boldsymbol{r}} = A^T\mathbf{b}$$

$$\boxed{\mathbf{x}_{\boldsymbol{r}} = (A^T A)^{-1} A^T \mathbf{b}}$$