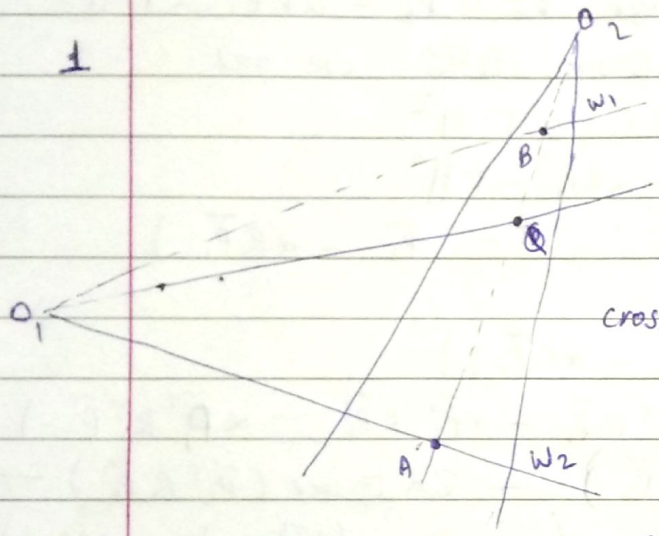
1



O_1W_1 & O_1W_2 are parallel in 3d

(O_1 & O_2 are the vanishing points)

$$\text{cross ratio} = \frac{AQ \cdot BO_2}{AB \cdot QO_2} \approx \frac{AQ}{AB} \quad \left(\because \begin{matrix} BO_2 \to \infty \\ QO_2 \to \infty \end{matrix}\right)$$

Now, since cross ratio is independent of the Affine transformation (in 3D) or perspective projection.

$$\therefore \left.\frac{AQ}{AB}\right|_{real} = \left.\frac{AQ \times BO_2}{AB \cdot QO_2}\right|_{\text{in image coordinates}}$$

$$\therefore AQ|_{\text{in real}} = AB_{\text{in real}} \times \left.\frac{AQ \times BO_2}{AB \cdot QO_2}\right|_{\text{in image pixels}}$$

$AB_{\text{in real}}$ ↓ 2012 cm

Since, we can directly calculate AB, BO_2, AQ, QO_2 from the image in pixels so we do not require any intrinsic parameter of camera ∴ we do not need calibrated camera for our calculations.