Compute $(\alpha', \beta', \gamma')$ in 2D

$$\boxed{\begin{aligned} x' &= \alpha' x_0' + \beta' x_1' + \gamma' x_2' \\ y' &= \alpha' y_0' + \beta' y_1' + \gamma' y_2' \end{aligned}}$$

$$\boxed{u = \alpha u_0 + \beta u_1 + \gamma u_2}$$

$$\boxed{\left(\frac{x}{z}\right) = \alpha' \left(\frac{x_0}{z_0}\right) + \beta' \frac{x_1}{z_1} + \gamma' \frac{x_2}{z_2}}$$

$$\Rightarrow x = \underbrace{\left(\frac{\alpha' z}{z_0}\right)}_{\alpha} x_0 + \underbrace{\left(\frac{\beta' z}{z_1}\right)}_{\beta} x_1 + \underbrace{\left(\frac{\gamma' z}{z_1}\right)}_{\gamma} x_2$$

$$z_0 = \frac{1}{z_0'}, \quad z_1 = \frac{1}{z_1'} \quad z_2 = \frac{1}{z_2'}$$

$$z' = \alpha' z_0' + \beta' z_1' + \gamma' z_2'$$

$$\Rightarrow \boxed{z = (\alpha' z_0' + \beta' z_1' + \gamma' z_2')^{-1}}$$

$$\Rightarrow \alpha = \frac{\alpha' z_0'}{z'} = \frac{\alpha' z_0'}{\alpha' z_0' + \beta' z_1' + \gamma' z_2'}$$

$$\beta = \frac{\beta' z_1'}{z'} = \frac{\beta' z_1'}{\alpha' z_0' + \beta' z_1' + \gamma' z_2'}$$

$$\gamma = \frac{\gamma' z_2'}{z'} = \frac{\gamma' z_2'}{\alpha' z_0' + \beta' z_1' + \gamma' z_2'}$$

$$\cancel{u = \alpha' z}$$

$$u = \alpha u_0 + \beta u_1 + \gamma u_2$$

$$u = \frac{\alpha' z_0'}{z'} u_0 + \frac{\beta' z_1'}{z'} u_1 + \frac{\gamma' z_2'}{z'} u_2$$

$$z' u = \alpha' z_0' u_0 + \beta' z_1' u_1 + \gamma' z_2' u_2$$

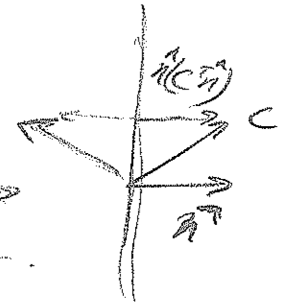
$$\frac{u}{z} = \alpha' \frac{u_0}{z_0} + \beta' \frac{u_1}{z_1} + \gamma' \frac{u_2}{z_2}$$

$$z' = \alpha' z_1' + \beta' z_1' + \gamma' z_2'$$

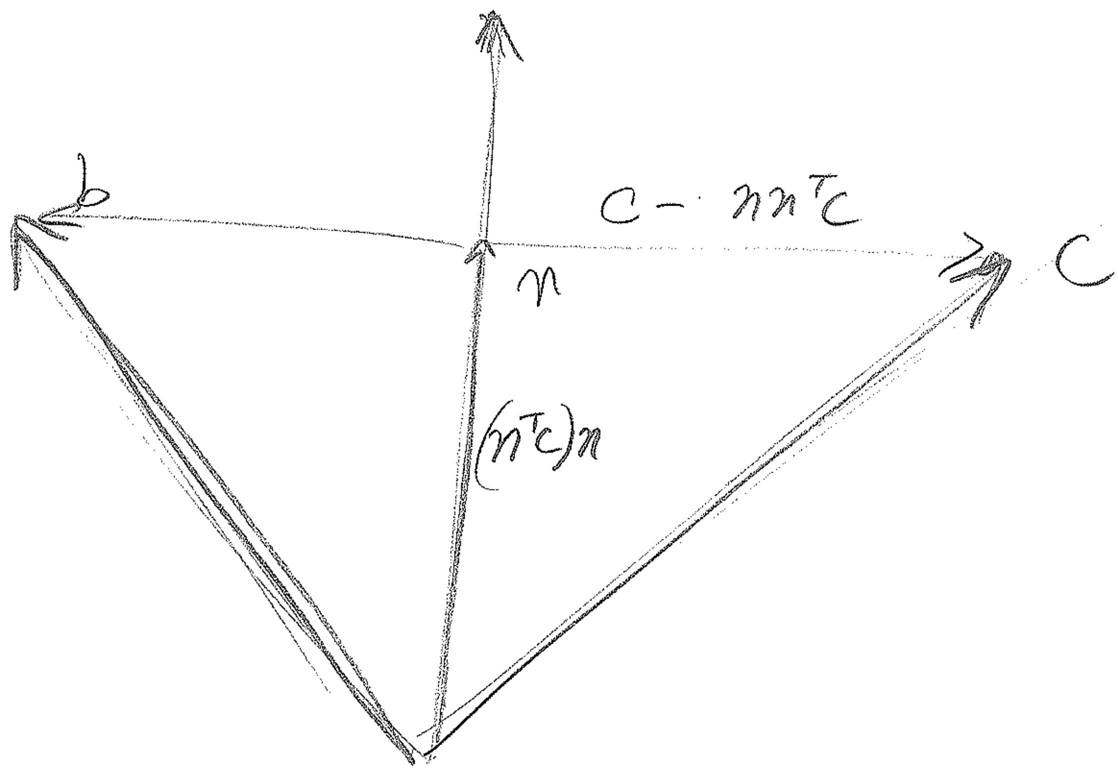
$$u = \frac{\alpha' z_0' u_0 + \beta' z_1' u_1 + \gamma' z_2' u_2}{\alpha' z_0' + \beta' z_1' + \gamma' z_2'}$$

Householder reflection

– not exactly → Householder



$$Hc = \begin{cases} c - 2nn^Tc \\ (I - 2nn^T)c \end{cases}$$



$$b = c - 2(c - nn^Tc)$$

$$= c - 2c + 2nn^Tc$$

$$= -c + 2nn^Tc$$

$$\boxed{b = (-I + 2nn^T)c} \quad ✓$$