CISC 330 - Assignment 3

Ground Truth Computation

$F_t = F_D$

$$ctr_t = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \quad x_t = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \quad y_t = \begin{bmatrix} 0 \\ -1 \\ 0 \end{bmatrix} \quad z_t = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

$$ctr_m = \begin{bmatrix} 7 \\ 0 \\ 22 \end{bmatrix} \quad x_m = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \quad y_m = \begin{bmatrix} 0 \\ -1 \\ 0 \end{bmatrix} \quad z_m = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

$$rotation_{t \to m} = \begin{bmatrix} dot(x_m, x_t) & dot(y_m, x_t) & dot(z_m, x_t) \\ dot(x_m, y_t) & dot(y_m, y_t) & dot(z_m, y_t) \\ dot(x_m, z_t) & dot(y_m, z_t) & dot(z_m, z_t) \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$translate = ctr_m - ctr_t = \begin{bmatrix} 7 \\ 0 \\ 22 \end{bmatrix}$$

$$T_t = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \quad V_t = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

$$T_m = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \underbrace{\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}}_{(T_t)} - \begin{bmatrix} 7 \\ 0 \\ 22 \end{bmatrix} = \begin{bmatrix} -7 \\ 0 \\ -22 \end{bmatrix}$$

$$V_m = \left(\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \underbrace{\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}}_{(V_t)} - \begin{bmatrix} 7 \\ 0 \\ 22 \end{bmatrix} \right) - \underbrace{T_m}_{(T_m)} = \begin{bmatrix} -7 \\ 0 \\ -21 \end{bmatrix} - \begin{bmatrix} -7 \\ 0 \\ -22 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$