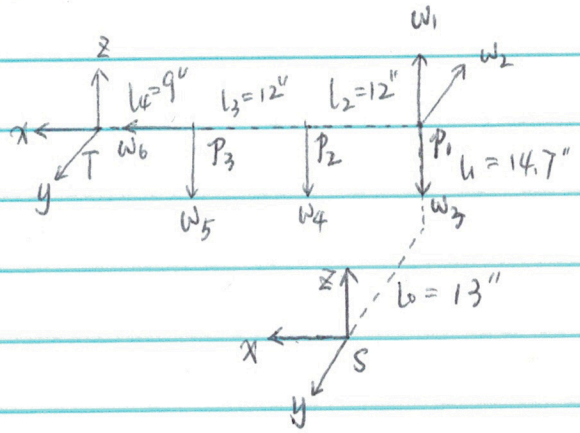

Note: As shown in the above graph, I renumber the axis from 1 to 6 for the convenience. $\omega_1, \omega_2, \cdots, \omega_6$ are associated with axis ①, ②, ⋯, ⑤

$$g_{st}(\theta) = e_1 e_2 e_3 e_4 e_5 e_6 \; g_{st}(0) = g_d$$

$$g_{st}(0) = \begin{bmatrix} I & \begin{matrix} l_4+l_3+l_4 \\ -l_0 \\ l_1 \end{matrix} \\ \begin{matrix} 0 & 0 & 0 \end{matrix} & 1 \end{bmatrix} \triangleq g_0$$

$$e_1 e_2 e_3 e_4 e_5 e_6 = g_d g_0^{-1} \triangleq g_1 \quad ①$$

$$e_{-6} e_{-5} e_{-4} e_{-3} e_{-2} e_{-1} = g_0 g_d^{-1} \triangleq g_2 \quad ②$$

(1) Let p_1 be the intersection point of axis ξ_1, ξ_2 and ξ_3.

Apply ② to p_1.

$$e_{-6} e_{-5} e_{-4} p_1 = g_2 p_1 \quad ③$$

Let p_3 be the intersection point of axis ξ_5 and ξ_6

$$e_{-6} e_{-5} p_3 = p_3 \quad ④$$

③ − ④,

$$e_{-6}e_{-5}e_{-4}p_1 - e_{-6}e_{-5}p_3 = g_2p_1 - p_3$$

$$\| e_{-6}e_{-5}(e_{-4}p_1 - p_3)\| = \|g_2p_1 - p_3\|$$

$$\| e_{-4}p_1 - p_3\| = \|g_2p_1 - p_3\| \quad ⑤$$

Apply SP3 to find θ_4.

(2). Let $p_4 = e_{-4}p_1$, so

$$e_{-6}e_{-5}p_4 = g_2p_1 \quad ⑥$$

Apply SP2 to find θ_5, θ_6

(3). With $\theta_4, \theta_5, \theta_6$ known,

$$e_1e_2e_3 = g_1e_{-6}e_{-5}e_{-4} = g_3 \quad ⑦$$

Pick a point p_5 that is on ξ_3 but not on ξ_2,

$$e_1e_2p_5 = g_3p_5 \quad ⑧$$

Apply SP2 to find θ_1 and θ_2.

(4). With ⑦ and θ_1 and θ_2.

$$e_3 = e_{-2}e_{-1}g_3 = g_4 \quad ⑨$$

Pick a point p_6 that is not on ξ_3.

$$e_3p_6 = g_4p_6 \quad ⑩$$

Apply SP1 to find θ_3.