ME586 Homework

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I. Problem 3.3

Compute the Jacobian of the SCARA manipulator in Figure 2.36.

$$\begin{pmatrix} s_5\ (c_3\, s_0 - s_3\ (c_0\, c_1\, c_2 - c_0\, s_1\, s_2)) - c_5\ (s_4\ (c_0\, c_1\, s_2 + c_0\, c_2\, s_1) - c_4\ (s_0\, s_3 + c_3\ (c_0\, c_1\, c_2 - c_0\, s_1\, s_2))) & s_5\ (s_4\ (c_0\, c_1\, s_2 + c_0\, c_2\, s_1 \\ -c_5\ (s_4\ (c_1\, s_0\, s_2 + c_2\, s_0\, s_1) + c_4\ (c_0\, s_3 - c_3\ (c_1\, c_2\, s_0 - s_0\, s_1\, s_2))) - s_5\ (c_0\, c_3 + s_3\ (c_1\, c_2\, s_0 - s_0\, s_1\, s_2)) & s_5\ (s_4\ (c_1\, s_0\, s_2 + c_2\, s_0\, s_1 \\ c_5\ (c_{1,2}\, s_4 + c_3\, c_4\, s_{1,2}) - s_3\, s_5\, s_{1,2} \\ 0 \end{pmatrix}$$

II. Problem 3.11

Prove (3.64) in an alternative way, i.e., by computing $S(\omega_e)$ as in (3.6) starting from $R(\phi)$ in (2.18).

III. Problem 3.12

With reference to (3.64), find the transformation matrix $T(\epsilon)$ in the case of RPY angles.