EME152 Equation Sheet

Complex Equations Standard Form

$$r_1 e^{i\phi_1} + r_2 e^{i\phi_2} = Z \tag{1}$$

$$(a + ir)\, e^{i\theta} = Z \tag{2}$$

Gruebler Equation

$$DOF = 3(n-1) - 2f_1 - f_2 \tag{3}$$

Range of Motion

Non-Grashof Linkage: $r_s + r_l > r_p + r_q$

$$\cos(\theta_2'') = \frac{r_1^2 + r_2^2 - (r_3 + r_4)^2}{2r_1 r_2} \tag{4}$$

Grashof Linkage: $r_s + r_l < r_p + r_q$

$$\cos(\theta_2'') = \frac{r_1^2 + r_2^2 - (r_3 - r_4)^2}{2r_1 r_2} \tag{5}$$

$$\Delta\theta_2 = 2|\theta_2''| \tag{6}$$

$$\theta_{2,min} = \theta_1 + \theta_2'' \tag{7}$$

$$\theta_{2,max} = 2\pi - (\theta_2'' - \theta_1) \tag{8}$$