$$\omega_{z1} = \frac{1}{r_{Cf}C}$$

$$\omega_{z2} = \frac{D'^2R}{DL} \qquad \text{(RHPZ)}$$

$$\omega_{p1} = \frac{V_{in} - 2V_{out}}{V_{in} - V_{out}} \frac{1}{RC}$$

Reference 2, 3, 4, and 5 equations:

$$\frac{V_{out}(s)}{V_{err}(s)} = \frac{\left(1 + \frac{s}{\omega_{z1}}\right)\left(1 - \frac{s}{\omega_{z2}}\right)\left(1 + \frac{s}{\omega_{z3}}\right)}{\left(1 + \frac{s}{\omega_{p1}}\right)} A_c F_h(s) \qquad \text{(2A-24)}$$

$$\frac{V_{out}(s)}{V_{in}(s)} = \frac{\left(1 + \frac{s}{\omega_{z1}}\right)}{\left(1 + \frac{s}{\omega_{p1}}\right)} A_l F_a(s)\, F_h(s) \qquad \text{(2A-25)}$$

$$\omega_{z1} = \frac{1}{r_{Cf}C}$$

$$\omega_{z2} = \frac{D'^2R}{DL} \qquad \text{(RHPZ)}$$

$$\omega_{z3} = \frac{1}{RC_sD'} > \frac{F_{sw}}{2} \qquad C_s \text{ is the resonant capacitor calculated on CCM CC-PWM switch model}$$

$$\omega_{p1} = \frac{D'\frac{K_c}{K}\left(1 + 2\frac{S_e}{S_n}\right) + 1 + D}{RC} \qquad \text{for deep CCM:} \quad \omega_{p1} \approx \frac{1 + D}{RC}$$

$$F_h(s) = \frac{1}{1 + \frac{s}{\omega_n Q_p} + \frac{s^2}{\omega_n{}^2}}$$

$$F_a(s) = \left(1 + \frac{s}{\omega_a Q_a} + \frac{s^2}{\omega_a{}^2}\right)$$

$$A_l = M\frac{\frac{K_c}{K}\left(M - 2\frac{S_e}{S_n}\right) - M}{\frac{K_c}{K}\left(1 + 2\frac{S_e}{S_n}\right) + 2M + 1}$$

$$A_c = -\frac{R}{R_i}\frac{1}{\frac{K_c}{K}\left(1 + 2\frac{S_e}{S_n}\right) + 2M + 1}$$

$$\omega_n = \frac{\pi}{T_{sw}}$$