$$\omega_{z2} = \frac{RD'^2}{L} \quad \text{(RHPZ)}$$

$$\omega_{p1} = \frac{\dfrac{2}{R} + \dfrac{T_{sw}}{LM^3}\left(1 + \dfrac{S_e}{S_n}\right)}{C}$$

Current-mode, DCM:

Reference 2, 3, 4, and 5 equations:

$$\frac{V_{out}(s)}{V_{err}(s)} = F_m H_d \frac{\left(1 + \dfrac{s}{\omega_{z1}}\right)\left(1 - \dfrac{s}{\omega_{z2}}\right)}{\left(1 + \dfrac{s}{\omega_{p1}}\right)\left(1 + \dfrac{s}{\omega_{p2}}\right)} \qquad (2A\text{-}17)$$

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

$$\omega_{z2} = \frac{R}{M^2 L} \quad \text{(high-frequency RHPZ)} \qquad \text{In relation to } \omega_{p2}: \qquad \omega_{z2} = \frac{\omega_{p2}}{1 - \dfrac{1}{M}} > 2F_{sw}$$

$$\omega_{p1} = \frac{1}{RC} \frac{2M - 1}{M - 1}$$

$$\omega_{p2} = 2F_{sw}\left(\frac{1 - \dfrac{1}{M}}{D}\right)^2 \geq 2F_{sw}$$

$$H_d = \frac{2V_{out}}{D} \frac{M - 1}{2M - 1}$$

$$F_m = \frac{1}{S_n m_c T_{sw}}$$

$$M = \frac{1 + \sqrt{1 + \dfrac{2D^2}{\tau_L}}}{2} \qquad \text{with } \tau_L = \frac{L}{RT_{sw}}$$

2A.3 Buck-Boost

Voltage-mode, CCM

Reference 1 equations:

$$\frac{V_{out}(s)}{V_{err}(s)} = -\frac{V_{in}}{(1 - D)^2 V_{peak}} \frac{\left(1 + \dfrac{s}{\omega_{z1}}\right)\left(1 - \dfrac{s}{\omega_{z2}}\right)}{1 + \dfrac{s}{Q\omega_0} + \left(\dfrac{s}{\omega_0}\right)^2} \qquad (2A\text{-}18)$$