F_{sw}	Switching frequency
R_i	Sense resistor in current mode
S_1 or S_n	Inductor on slope, e.g., $\frac{V_{in}}{L}$ for a boost converter
S_2 or S_f	Inductor off slope, e.g., $\frac{V_{out} - V_{in}}{L}$ for a boost converter
S_a or S_e	External ramp compensation slope
m_c	Compensation ramp according to Ridley notation [2]: $m_c = 1 + \frac{S_e}{S_n}$

2A.1 Buck

Voltage-mode, CCM:

Reference 1 equations:

$$\frac{V_{out}(s)}{V_{err}(s)} = \frac{V_{in}}{V_{peak}} K_c \frac{1 + \frac{s}{\omega_{z1}}}{1 + \frac{s}{Q\omega_0} + \left(\frac{s}{\omega_0}\right)^2} \tag{2A-1}$$

$$\frac{V_{out}(s)}{V_{in}(s)} = D \frac{1 + \frac{s}{\omega_{z1}}}{1 + \frac{s}{Q\omega_0} + \left(\frac{s}{\omega_0}\right)^2} \tag{2A-2}$$

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

$\omega_{z2} = \infty$ no RHPZ for the CCM buck

$$K_c = \frac{R}{r_{Lf} + R} \quad \text{if } r_{Lf} = r_{Cf} \approx 0 \quad K_c = 1$$

$$\omega_0 = \frac{1}{\sqrt{LC \frac{R + r_{Cf}}{R + r_{Lf}}}} \quad \text{if } r_{Lf} = r_{Cf} \approx 0 \quad \omega_0 = \frac{1}{\sqrt{LC}}$$

$$Q = \frac{1}{\frac{Z_o}{r_{Lf} + R} + \frac{r_{Cf} + r_{Lf} \| R}{Z_o}} \quad \text{if } r_{Lf} = r_{Cf} \approx 0 \quad Q = R\sqrt{\frac{C}{L}}$$

with $Z_o = \sqrt{\frac{L}{C}}$, the LC network characteristic equation.

Voltage-mode, DCM

Reference 1 equations:

$$\frac{V_{out}(s)}{V_{err}(s)} = \frac{V_{in}}{V_{peak}} \frac{K_1\left(1 + \frac{s}{\omega_{z1}}\right)}{\left(1 + \frac{s}{\omega_{p1}}\right)} \tag{2A-3}$$