Hysteretic DC-DC Converter

condition for stability of hysteretic dc-dc conv.

$R_{esr} \cdot C_o > \frac{T_{on}}{2}$ or $\frac{T_{off}}{2}$ whichever is greater

$\Rightarrow$ for duty cycle > 50 %.

$R_{esr} \cdot C_o > T_{on}/2$

for $D < 50\%$.

$R_{esr} C_o > T_{off}/2$

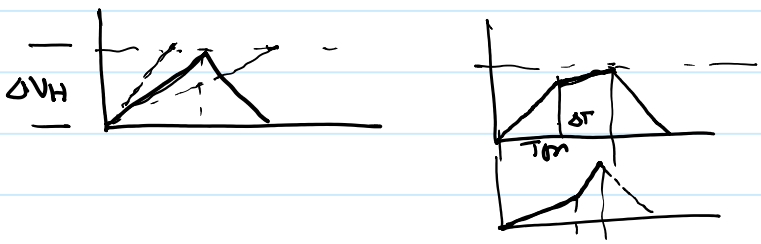
$\Rightarrow R_{esr} C_o > T_{sw}/2$ satisfies all D.

$$\Delta I_L = \frac{V_{in} - V_o}{L} \times \frac{D}{F_{sw}}$$

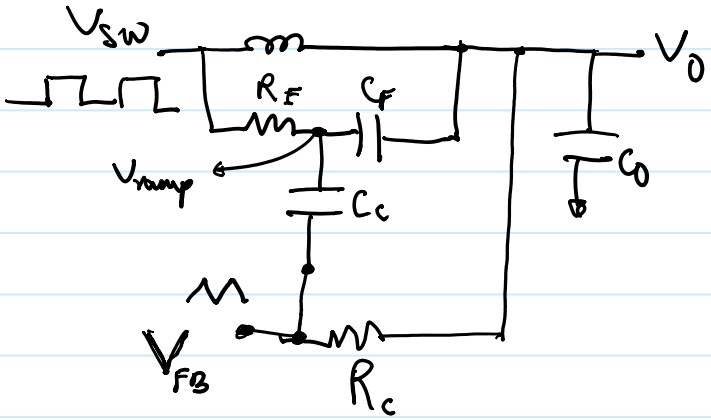
$$= \frac{V_{in}\, D\,(1-D)}{L \times F_{sw}} \Rightarrow F_{sw} = \frac{V_{in}\, D(1-D)}{L \times \Delta I_L}$$

$$\Delta I_L = \frac{\Delta V_H}{R_{esr}}$$

$$F_{sw} = \frac{V_{in}\, D\,(1-D)}{L \cdot \Delta V_H} R_{esr}$$



Resetting C of RC filter



$V_{FB} \Rightarrow V_0\,(dc) + V_{ramp}\,(ac)$

C_c → needed to extract only ac component of V_{ramp}

C_c can be eliminated by resetting V_{ramp} to V_0 at rising and falling edges of PWM or V_{sw}