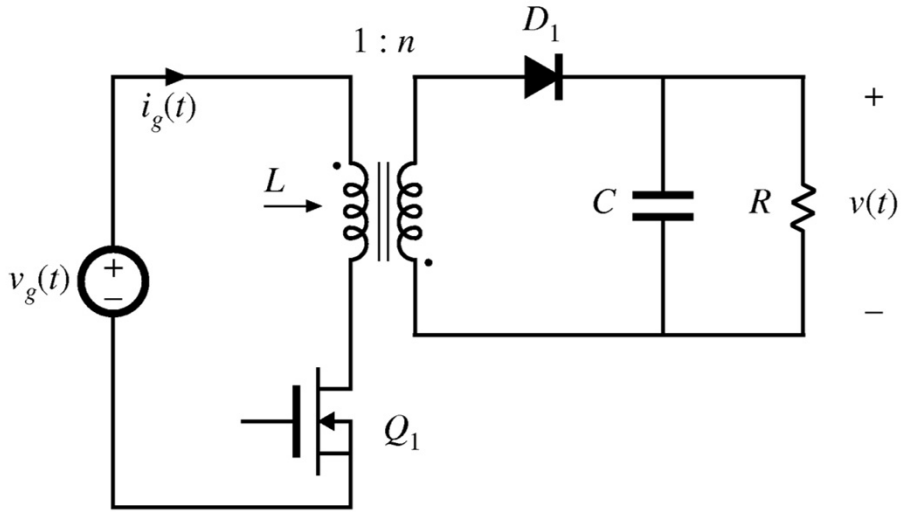
7.2.10: Nonideal Flyback



Flyback Linearization

$$L\frac{d\left\langle i(t)\right\rangle_{T_s}}{dt} = d(t)\left\langle v_g(t)\right\rangle_{T_s} - d(t)\left\langle i(t)\right\rangle_{T_s} R_{on} - d'(t)\frac{\left\langle v(t)\right\rangle_{T_s}}{n}$$

$$C\frac{d\left\langle v(t)\right\rangle_{T_s}}{dt} = d'(t)\frac{\left\langle i(t)\right\rangle_{T_s}}{n} - \frac{\left\langle v(t)\right\rangle_{T_s}}{R}$$

$$\left\langle i_g(t)\right\rangle_{T_s} = d(t)\left\langle i(t)\right\rangle_{T_s}$$

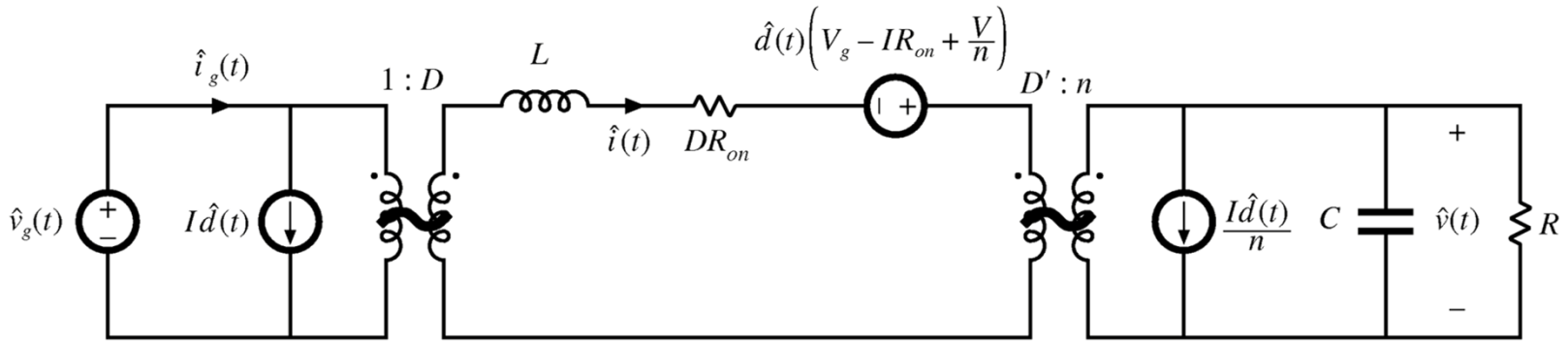
Flyback Small Signal Model

$$L\frac{d\hat{i}(t)}{dt} = D\hat{v}_g(t) - D'\frac{\hat{v}(t)}{n} + \left(V_g + \frac{V}{n} - IR_{on}\right)\hat{d}(t) - DR_{on}\hat{i}(t)$$

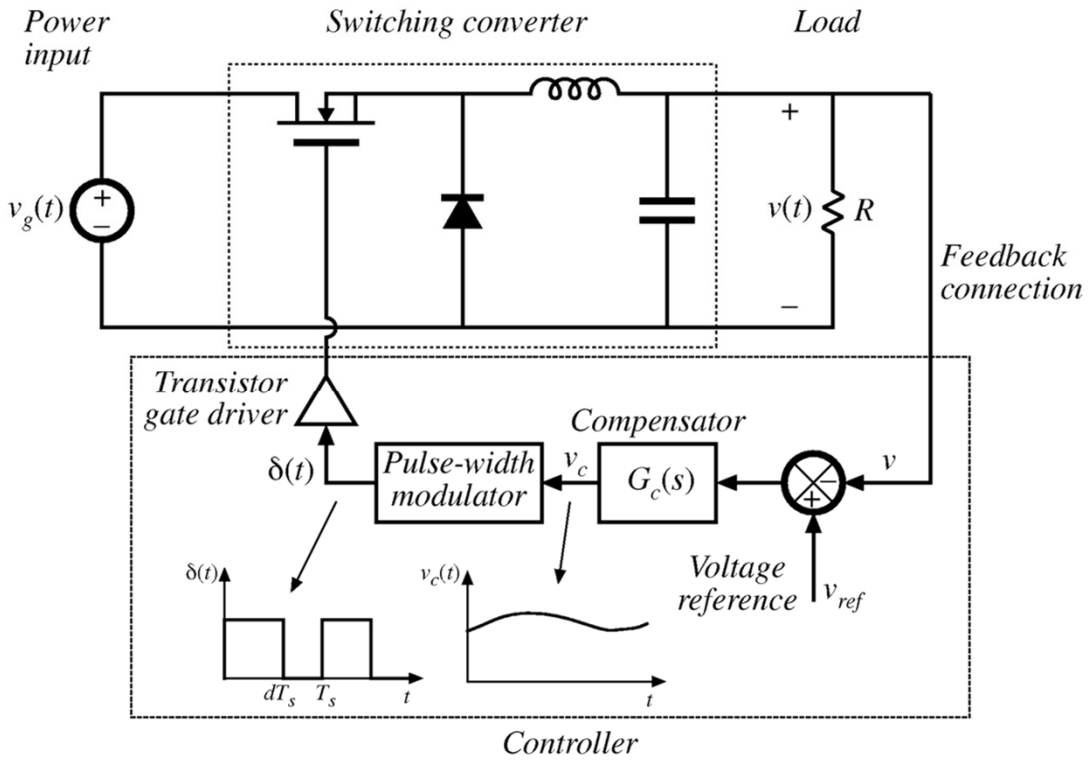
$$\hat{i}_g(t) = D\hat{i}(t) + I\hat{d}(t)$$

$$C\frac{d\hat{v}(t)}{dt} = \frac{D'\hat{i}(t)}{n} - \frac{\hat{v}(t)}{R} - \frac{I\hat{d}(t)}{n}$$

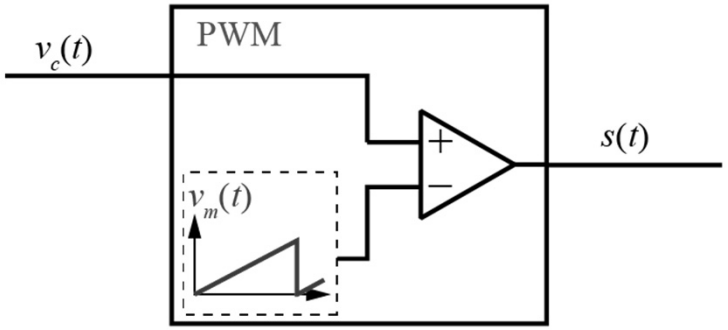
Flyback AC Model

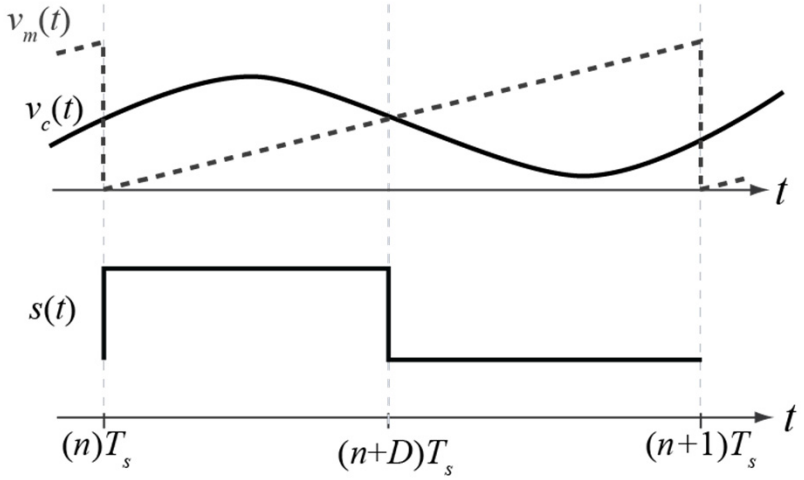


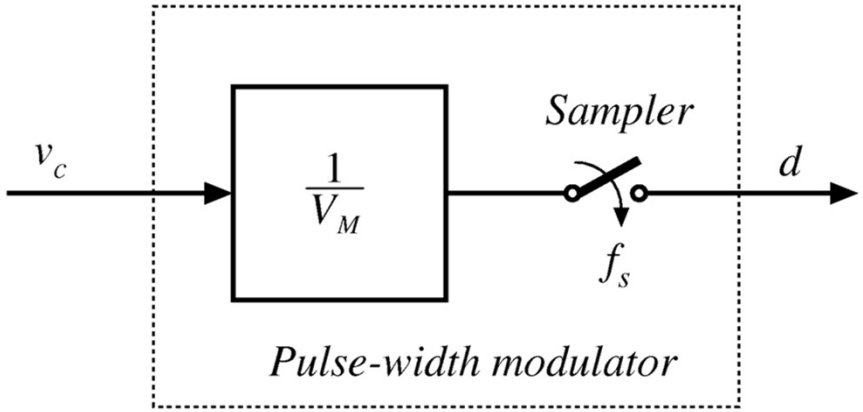
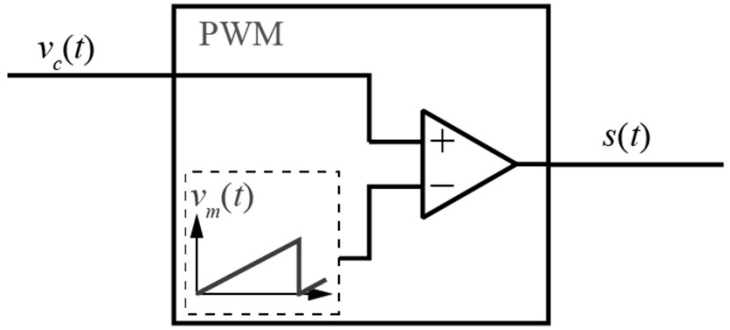
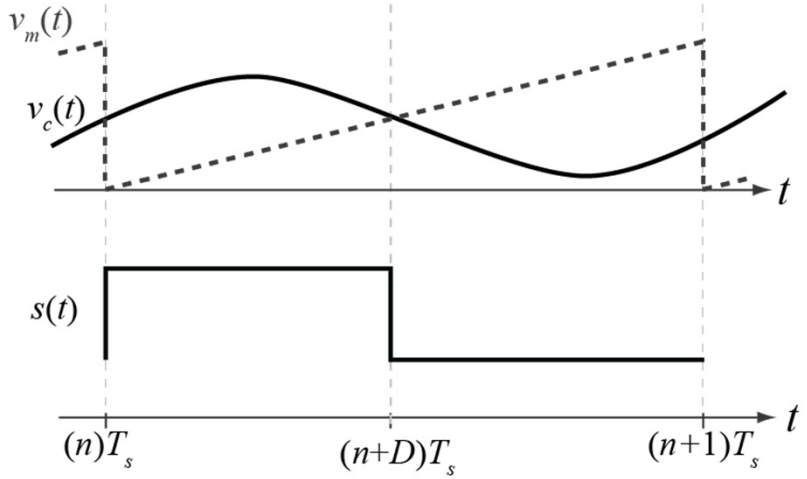
7.3: Modeling Pulse Width Modulator



Functional PWM Model





Small-signal model of PWM

Sampling Behavior of PWM