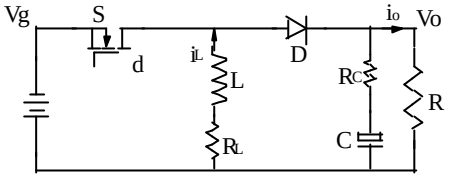
Buckboost 变换器的 DCM 小信号传递函数

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（1）电路原理图



（2）DCM 小信号传递函数

$$\hat{v}_o(s) = G_{vd}(s)\times\hat{d}(s) + G_{vg}(s)\times\hat{v}_g(s) - Z_{out}(s)\times\hat{i}_o(s)$$

$$G_{vd}(s) = G_{vd0}\frac{(1-s/w'_a)(1+s/w_{zc})}{(1+s/w'_{p1})(1+s/w'_{p2})} \approx G_{vd0}\frac{(1-s/w'_a)(1+s/w_{zc})}{(1+s/w'_{p1})}$$

$$G_{vg}(s) = G_{vg0}\frac{1+s/w_{zc}}{(1+s/w'_{p1})(1+s/w'_{p2})} \approx G_{vg0}\frac{1+s/w_{zc}}{(1+s/w'_{p1})}$$

$$Z_{out}(s) = R_0\frac{1+s/w_{zc}}{(1+s/w'_{p1})(1+s/w'_{p2})} \approx R_0\frac{1+s/w_{zc}}{(1+s/w'_{p1})}$$

其中：$w'_a = \dfrac{R}{M(1+M)L}$，$w_{zc} = \dfrac{1}{R_C C}$，$w'_{p1} = \dfrac{2}{RC}$

$$w'_{p2} = 2f_s\left[\frac{1}{D(1+1/M)}\right]^2$$

$$G_{vd0} = \frac{V_o}{\sqrt{K}M}，\ G_{vg0} = M，\ R_0 = \frac{1}{2}R$$

$$M = \frac{V_o}{V_g} = \frac{D}{\sqrt{K}}，\ K = \frac{2Lf_s}{R}$$