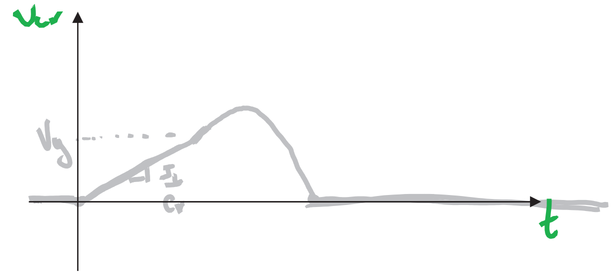
Averaging

Apply volt-second balance on L_f

$\langle v_{Lf} \rangle = 0 = \langle v_{sw} \rangle - V$

$0 = V_g - \langle v_{cr} \rangle - \cancel{\langle v_{Lr} \rangle}^{0} - V$

$V = V_g - \langle v_{cr} \rangle$



Complete Solution

$$\theta_1 = \frac{1}{J_L}$$

$$J_2 = \sqrt{{J_L}^2 - 1}$$

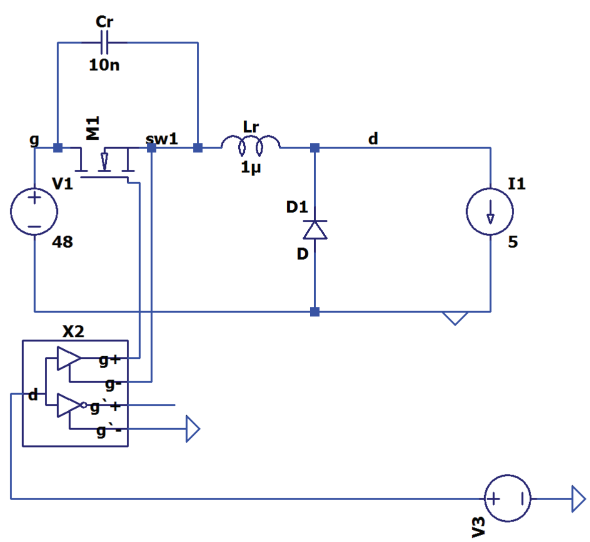
$$\beta = \pi + \sin^{-1}\left(\frac{1}{J_L}\right)$$

$$\theta_3 = J_2 + J_L$$

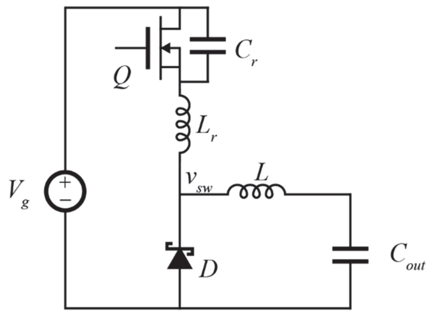
$$\frac{2\pi}{F} = \theta_1 + \beta + \theta_3 + \theta_4$$

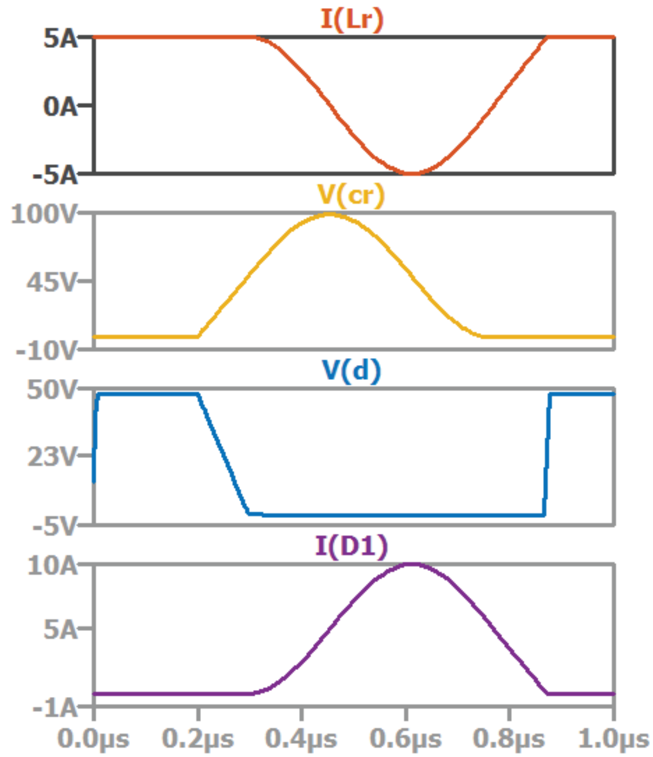
MOSFET Voltage Stresses

Test Circuit

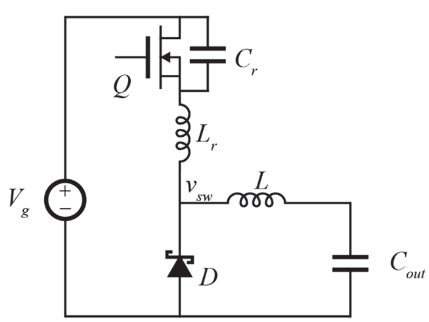


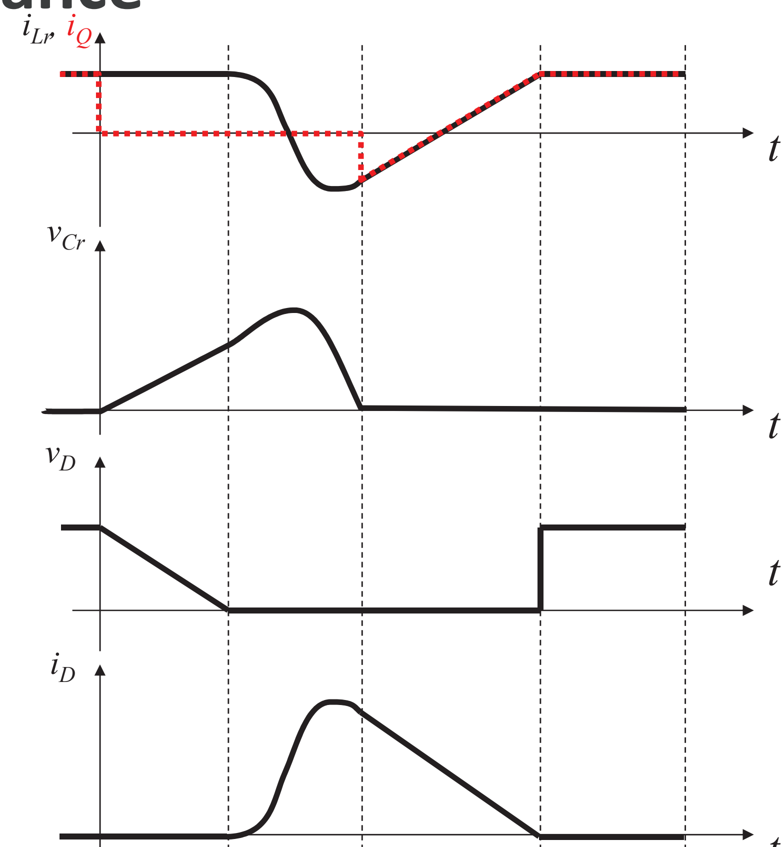
Simulation Results



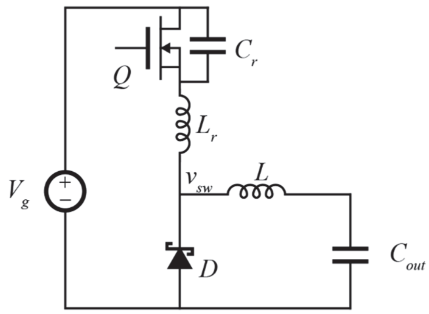


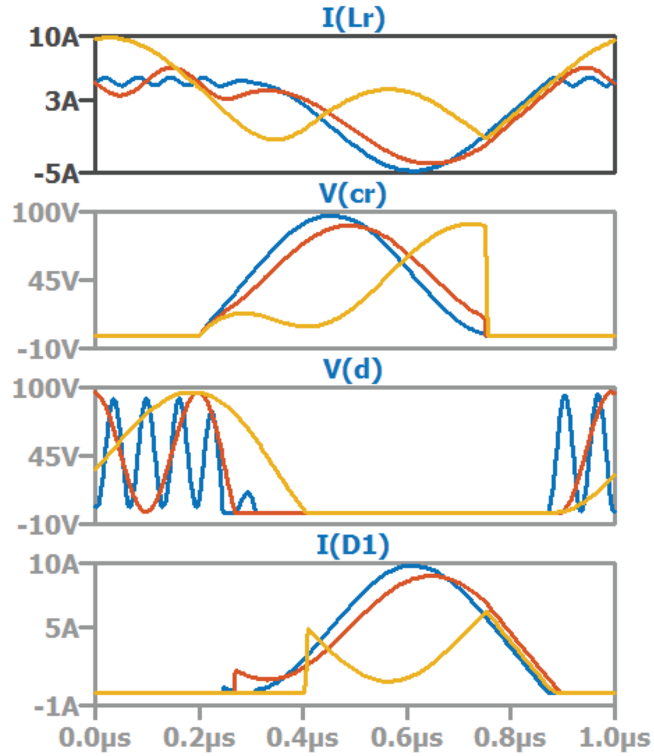
Diode Capacitance



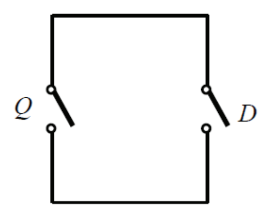


Simulation Results: Diode Capacitance

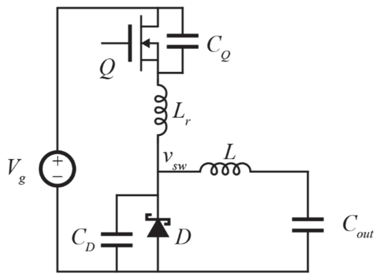




Wishlist: Multi-Resonant



ZVS-MR Buck



W. A. Tabisz and F. C. Lee, "Zero-voltage-switching multi-resonant technique-a novel approach to improve performance of high frequency quasi-resonant converters," *Power Electronics Specialists Conference, 1988.*

Operating Modes

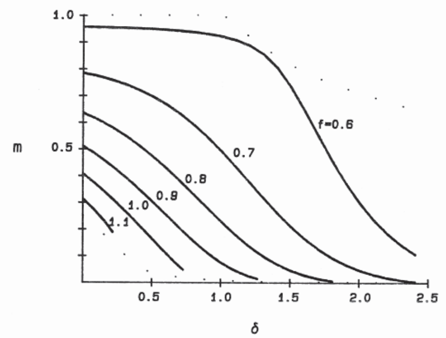
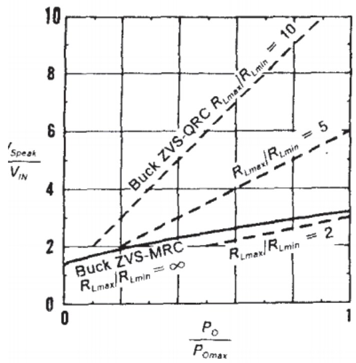


Figure 10.7: Load-to-output DC characteristics of a ZV-MR converter operating in modes $(I, II)_1$.



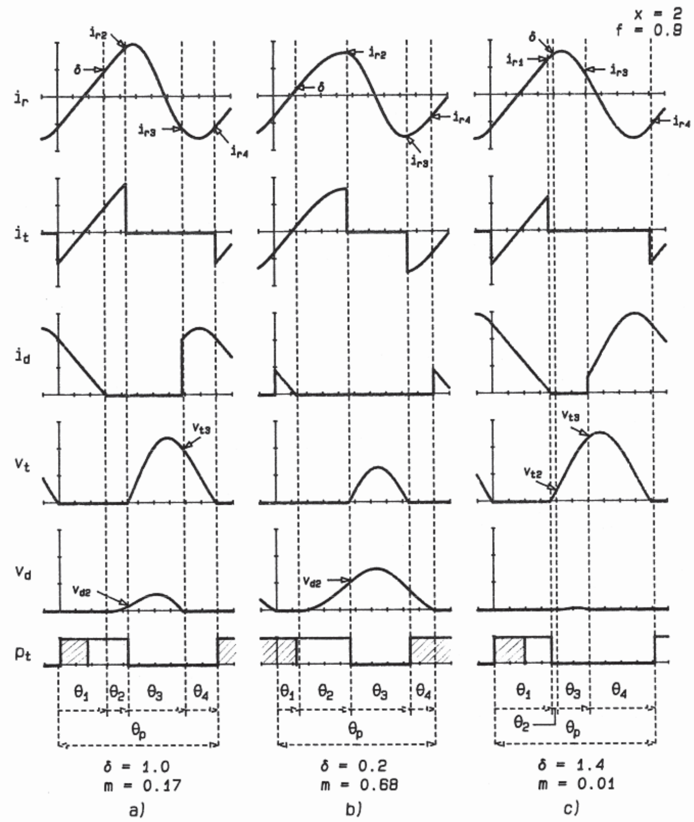


Figure 10.2: Typical waveforms for a ZV-MR converter operating in modes I_1 (a), II_1 (b) or III_1 (c).