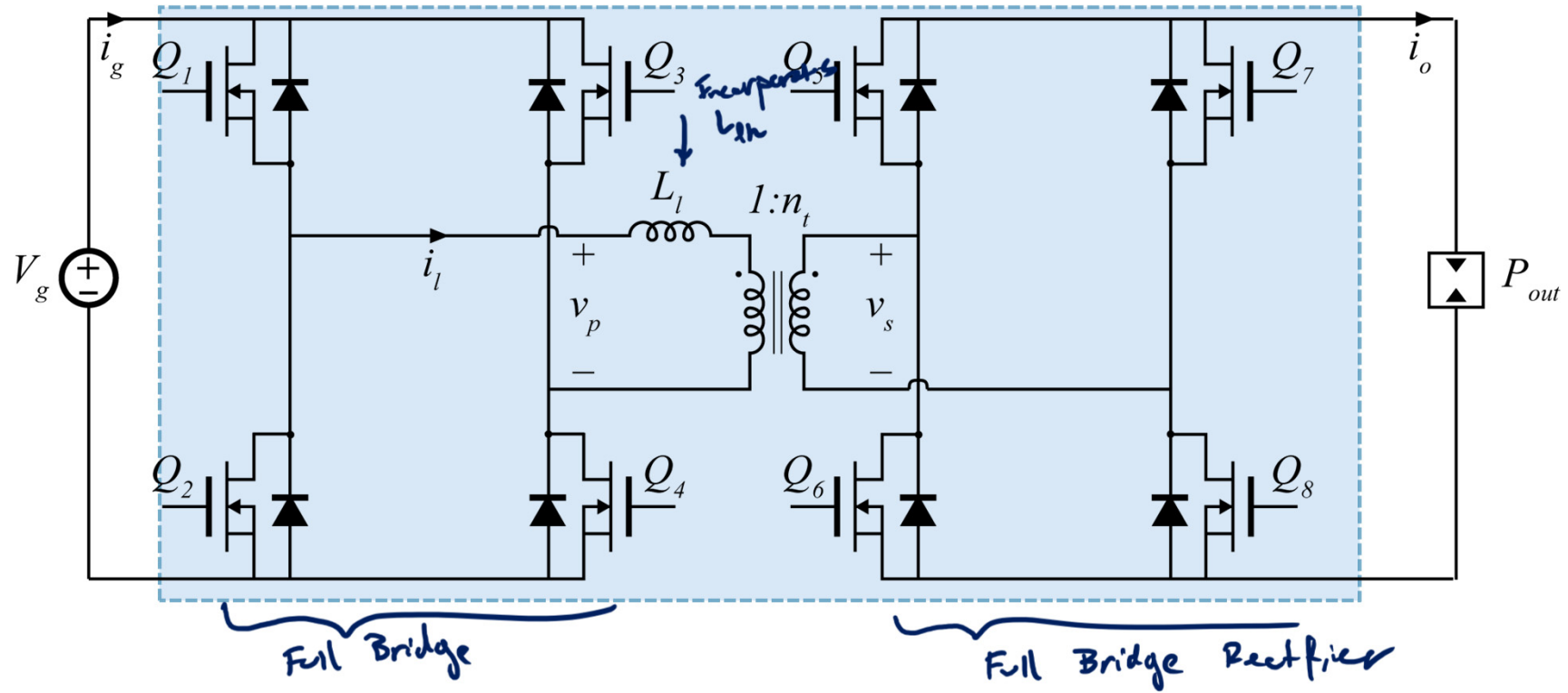
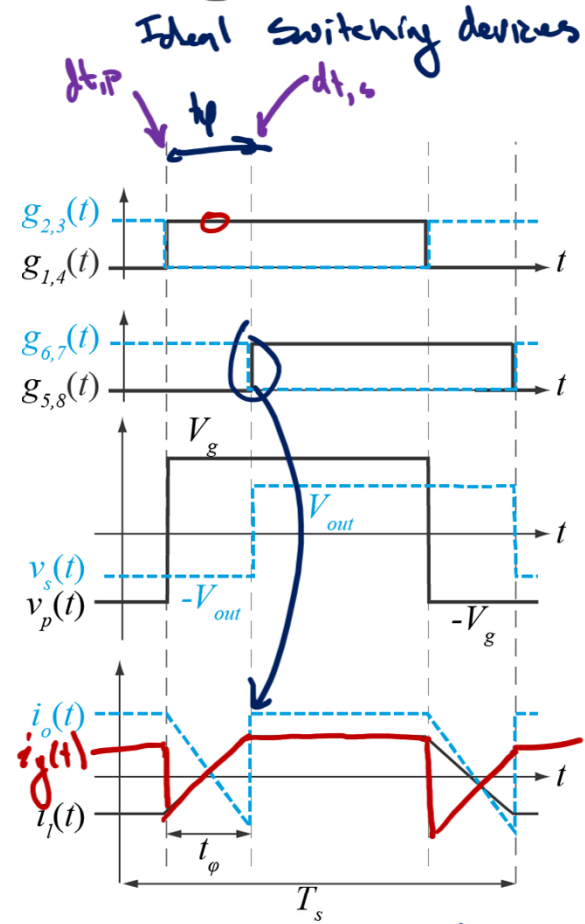


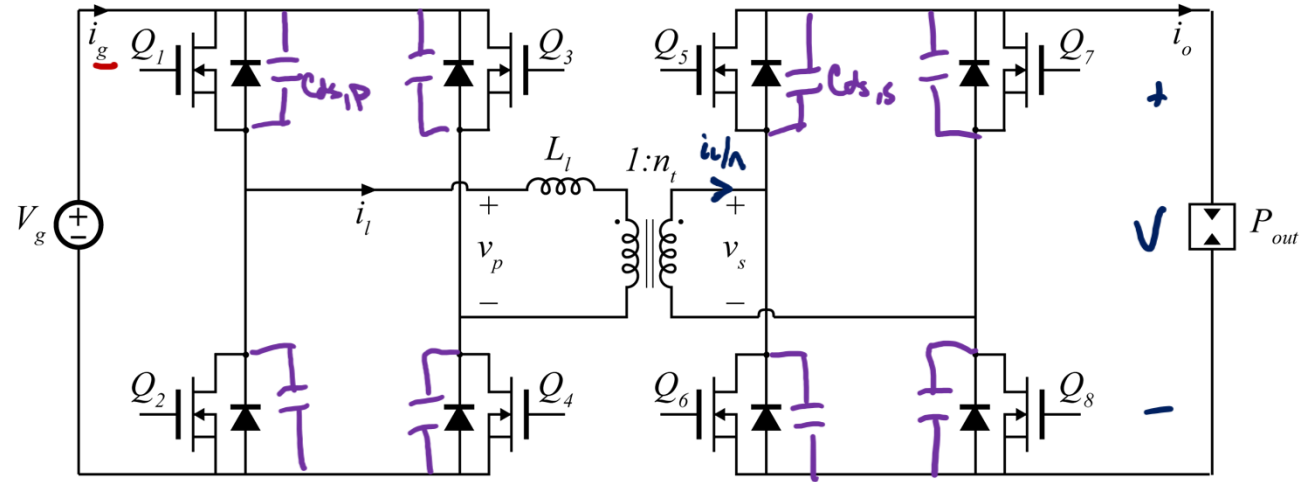
Dual Active Bridge



Switching Behavior (PSM) Phase Shift Modulation

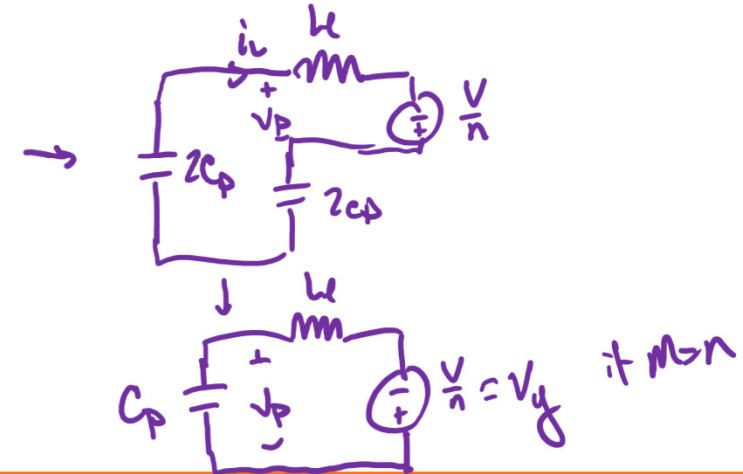
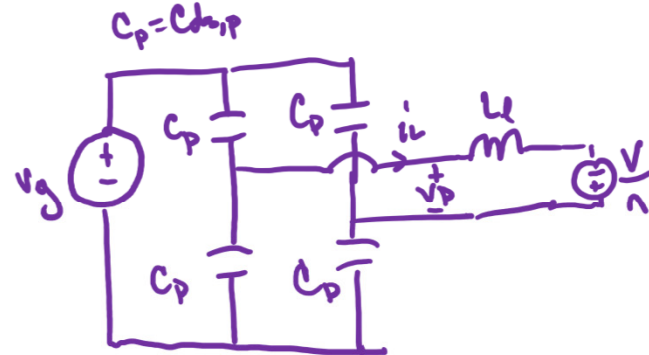


operated with $m = \frac{V}{V_g} = n$

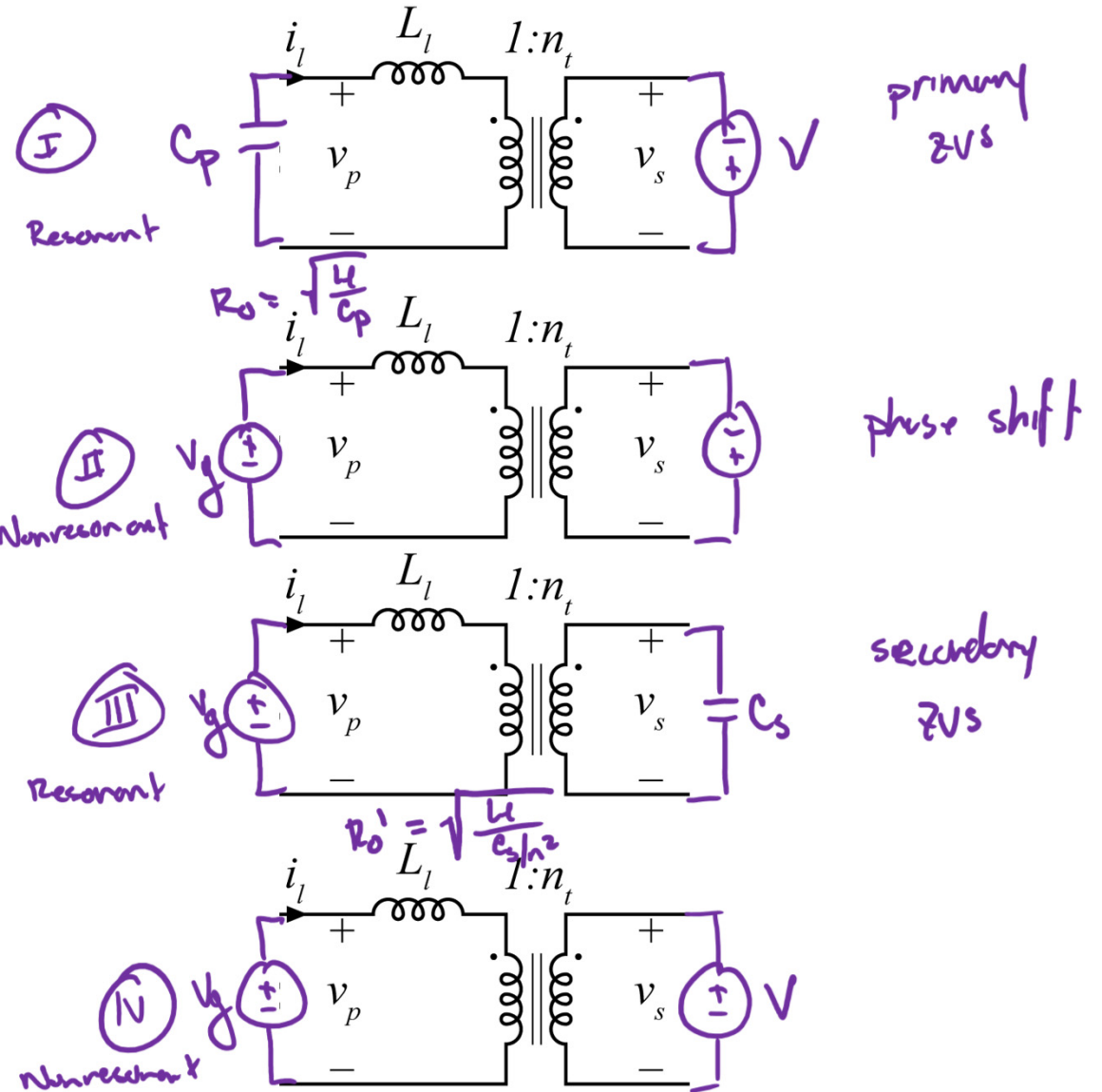
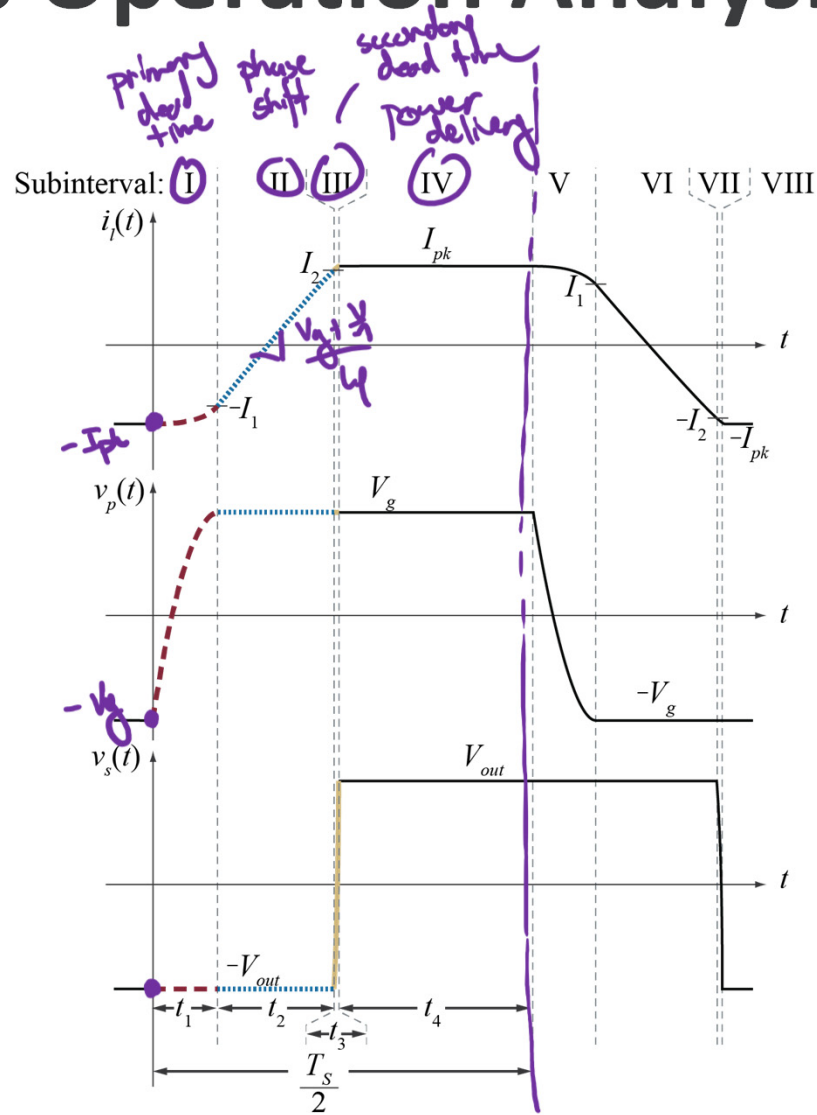


AC waveforms in the tank are half-cycle antisymmetric
DC-side waveforms are half-cycle symmetric

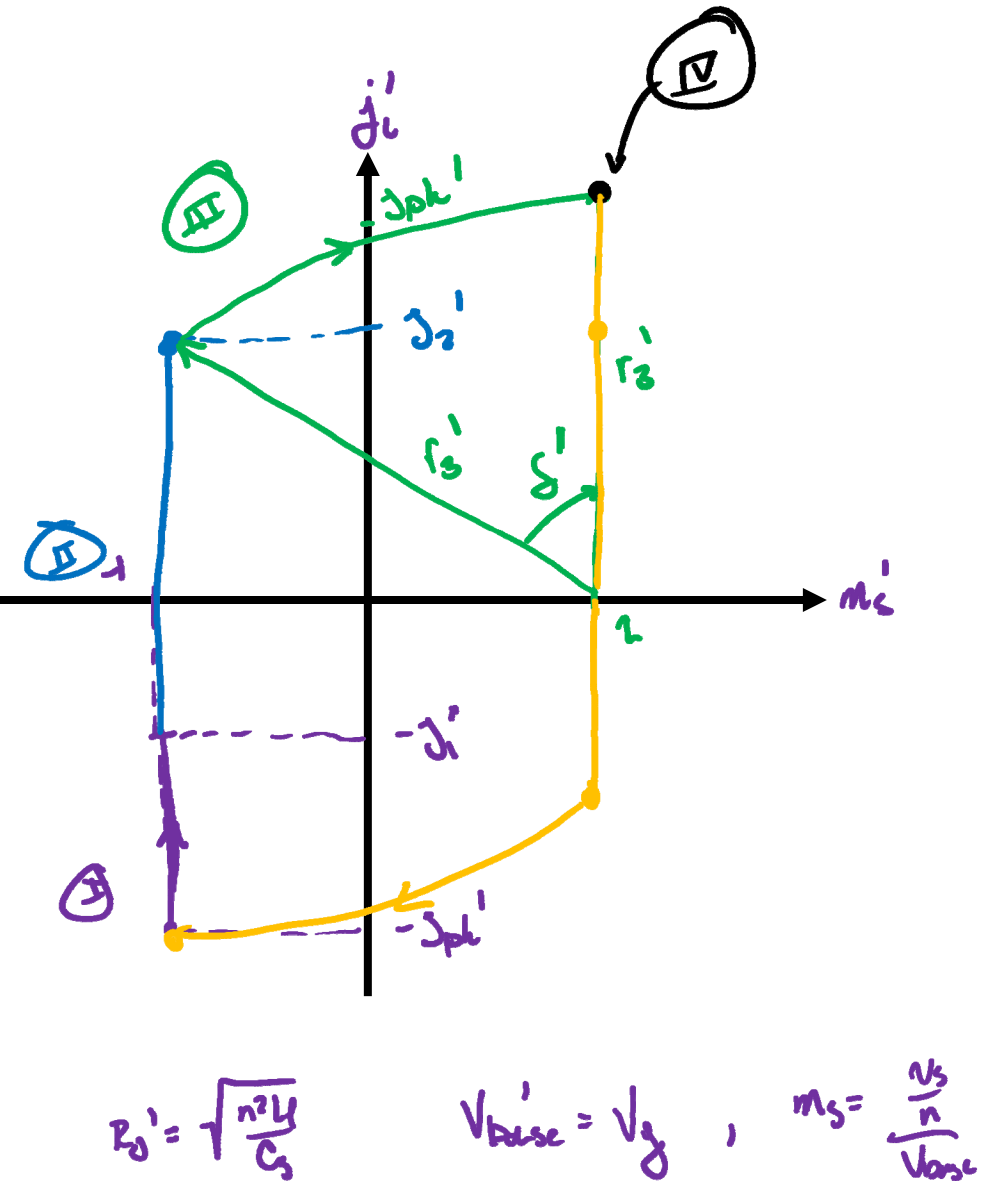
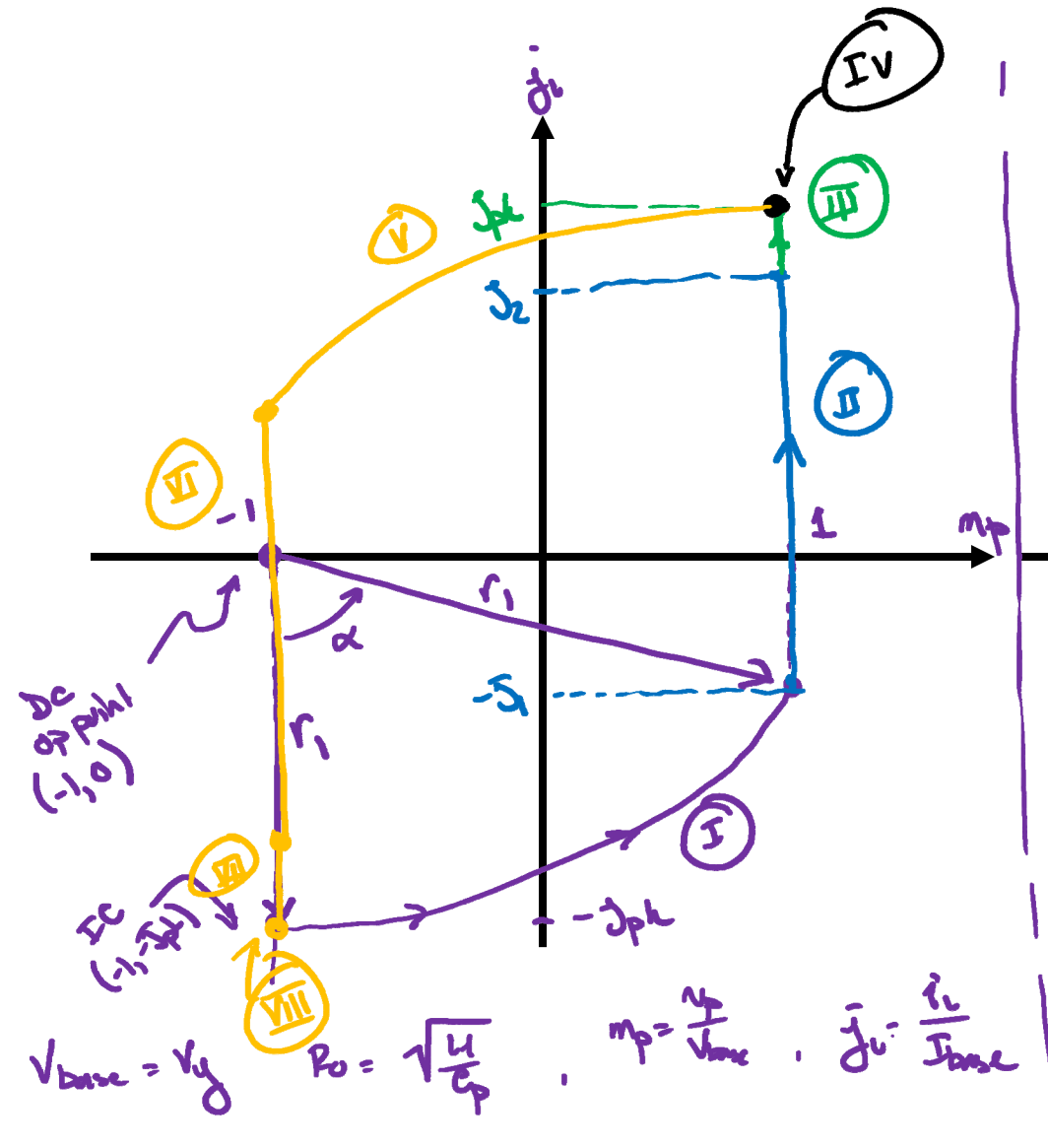
primary dead time



DAB Operation Analysis



DAB State Plane



ZVS Condition

primary side zvs:

$$I_{ph} = r_1 > 2$$

$$\boxed{I_{ph} > 2}$$

will lose zvs at light load \rightarrow $P_{out, min}$ @ which zvs is obtained

$$\frac{I_{ph}}{I_{p, max}} > 2$$

$$\rightarrow I_{ph} R_o > 2V_g$$

$$\frac{1}{2} L_e I_{ph}^2 > \frac{1}{2} C_p (2V_g)^2$$

secondary - side zvs:

$r_o' > 2 \rightarrow$ always true in this mode of operation