ECE581

Design of a Series Resonant Converter

The SRC of Fig. 1 is designed with the following parameters. Note that $V_{out} \neq nV_g$..

- $L_l = 30\mu H$
- $C_r = 5$ nF
- $V_g = 100$ V
- $V_{out} = 150$ V
- $n = 1$
- $F = 1.1$

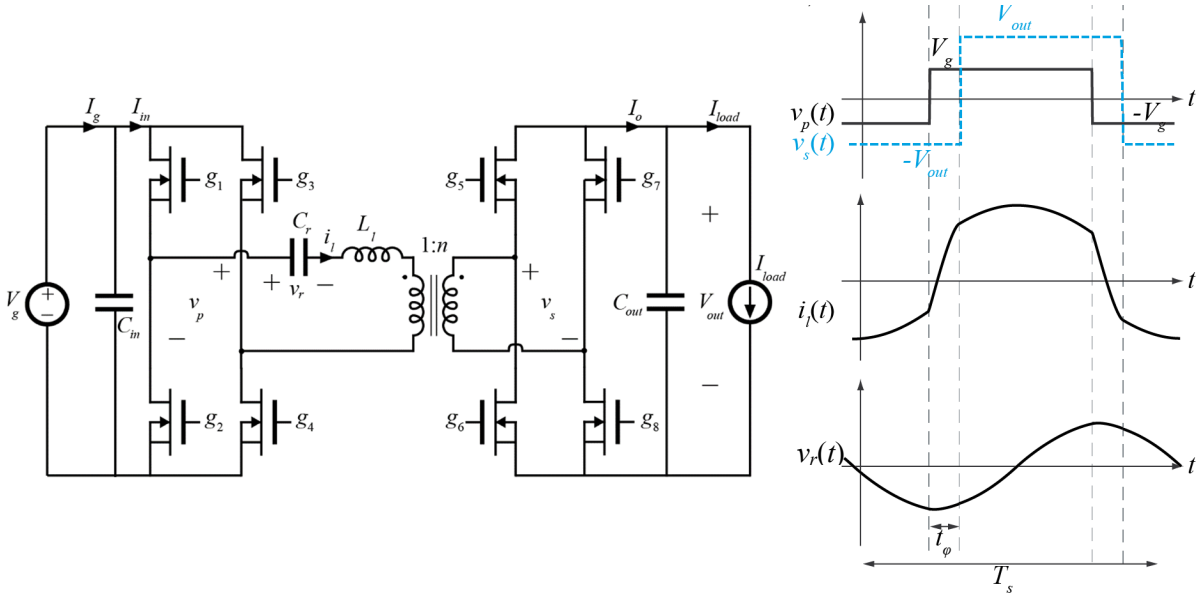

Fig. 1: Series resonant converter

At an operating point of $P_{out} = 750$ W, solve the following. Select an operating point with minimal peak currents, if multiple solutions exist for the given parameters.

a) Derive a complete set of state plane equations for the SRC at this operating point.
b) Sketch the m_r-j_l state plane over one complete period. Label all salient features over one half-period
c) Solve the state plane Give values for f_s and t_φ
d) Sketch the time-domain waveforms for $i_l(t)$ and $v_r(t)$. Label peak values, as well as the values at each switching instant.