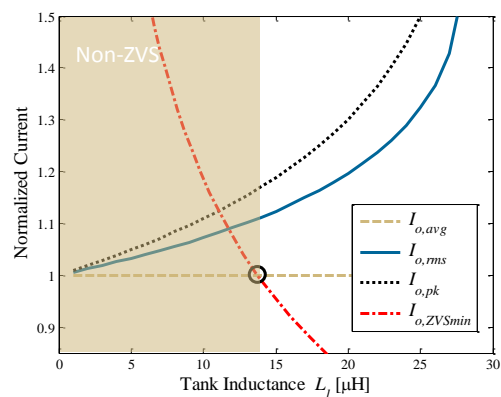


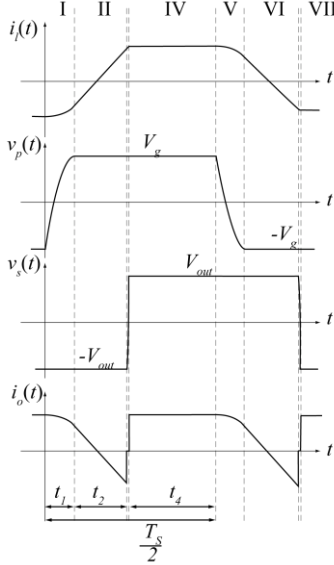
## Constraints on Inductance

- From previous analysis, smaller  $L_l$  results in smaller RMS currents in converter
- However,  $L_l$  must be large enough to store energy necessary for ZVS
- Near-optimal design at a single operating point by selecting  $L_l$  just large enough to obtain ZVS





# DAB Operation Analysis



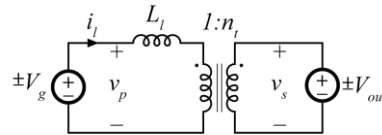
- Phase-shifted DAB has four unique intervals per half-period

- Primary dead time
- Phase shift
- Secondary dead time
- Main power delivery

- Begin by considering DCX operation, where

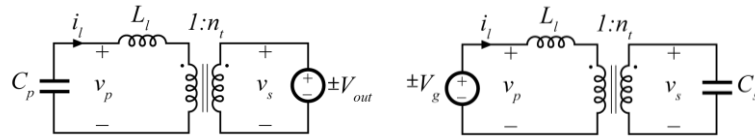
$$V_{out} = n_t V_g$$

- Even-numbered intervals, circuit reduces to

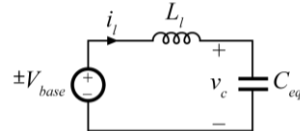


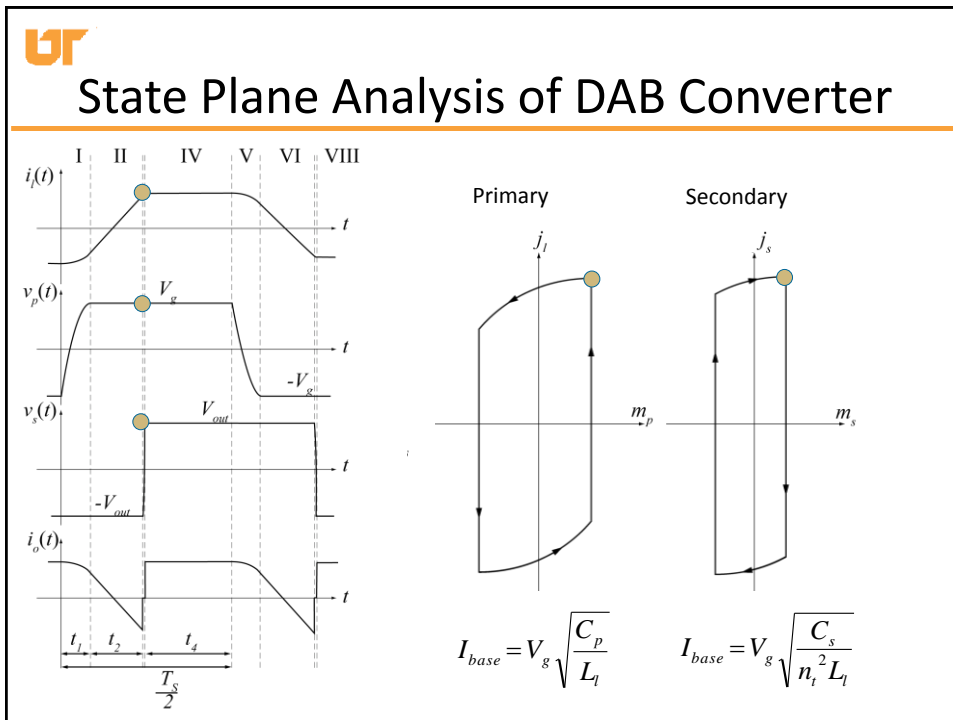
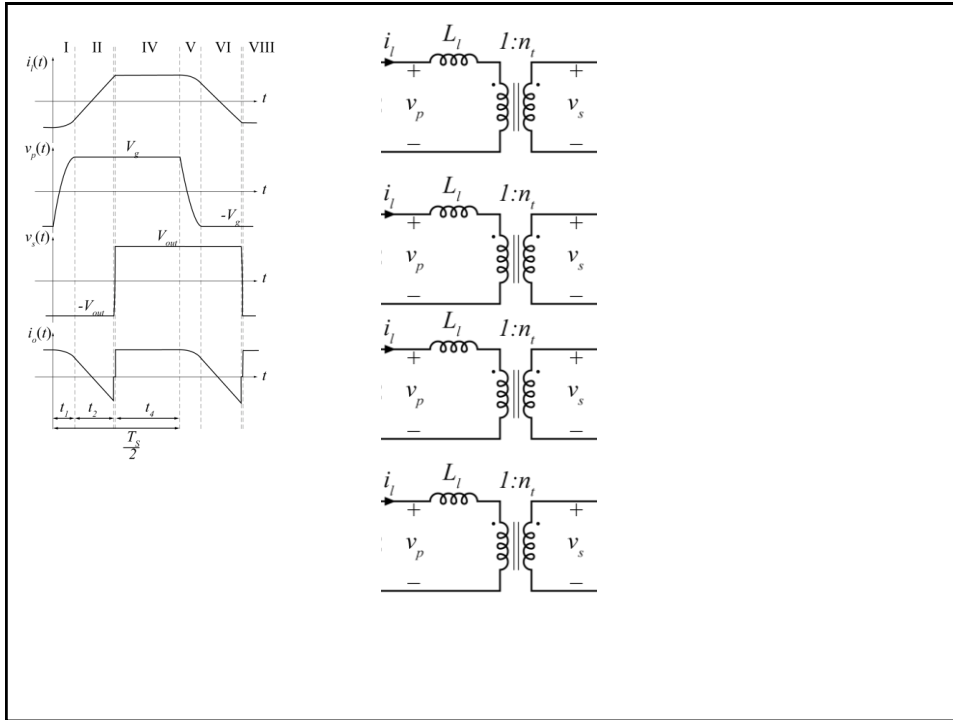
# Resonant Interval Analysis

- Resonant intervals have equivalent circuits of the form:



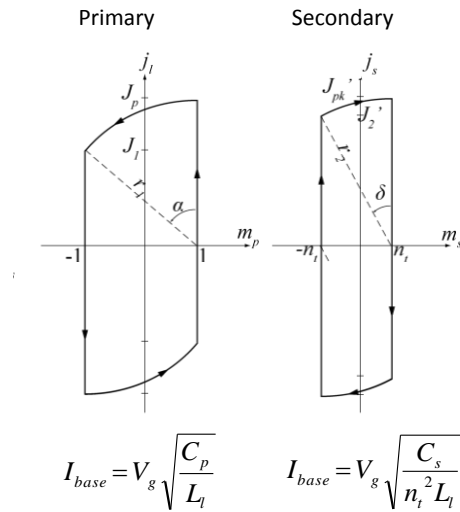
- Both of which can be simplified to:







## State Plane Analysis of DAB Converter



## Averaging Step