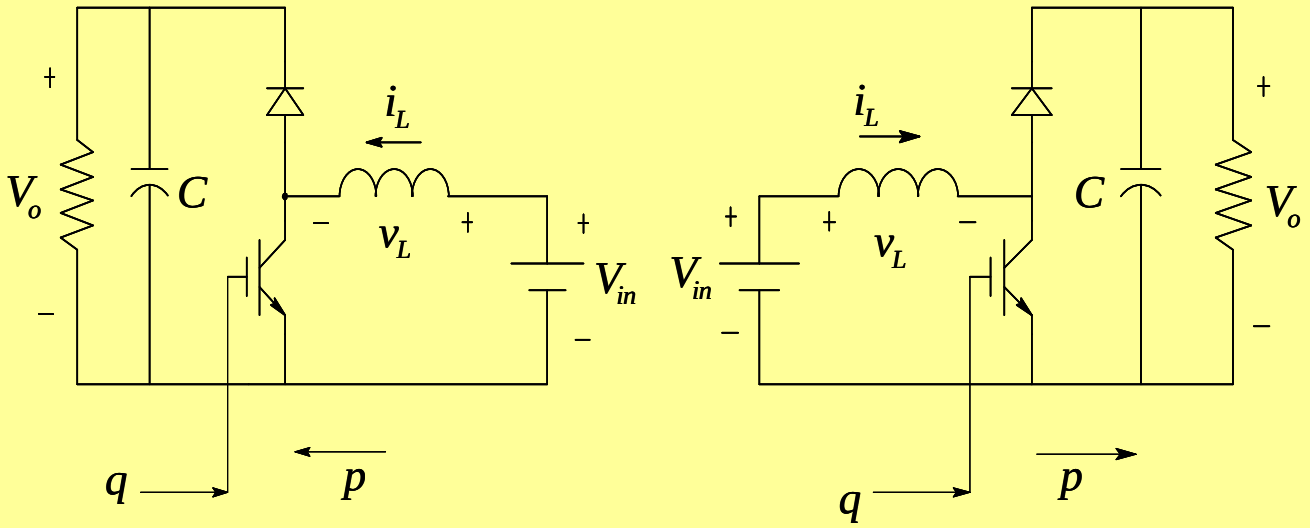
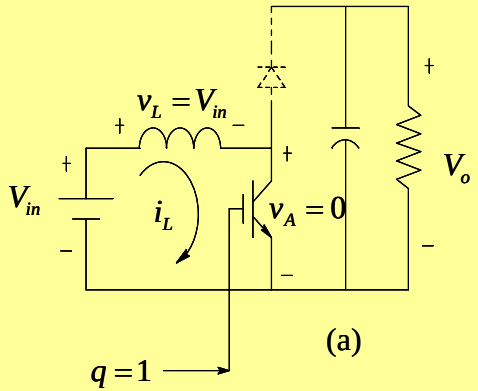
Boost (Step-up DC-DC) Converters

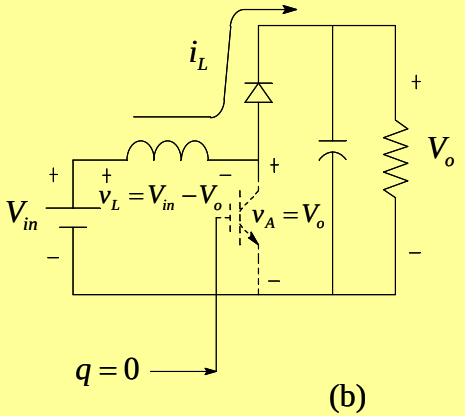
- Applications
- Operation in Steady State

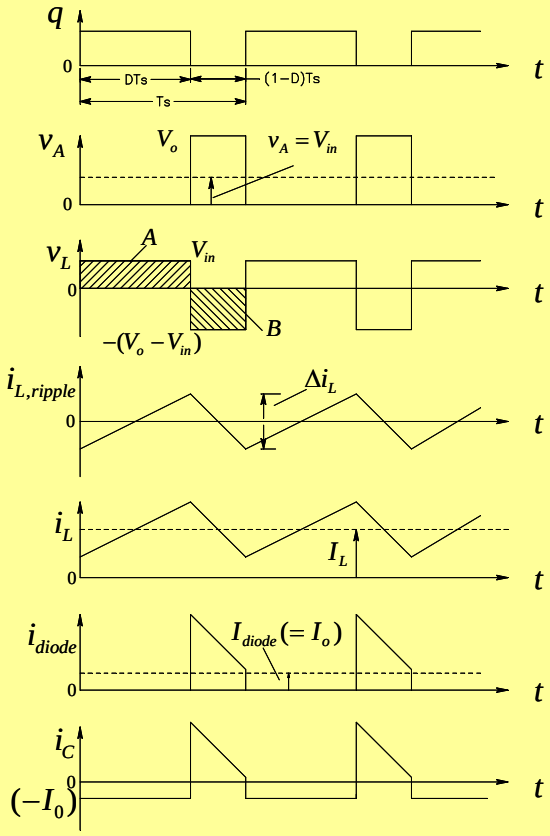
BOOST CONVERTER SWITCHING ANALYSIS IN DC STEADY STATE



Boost converter: operation and waveforms







$$\frac{V_o}{V_{in}} = \frac{1}{1-D} \qquad (V_o > V_{in})$$

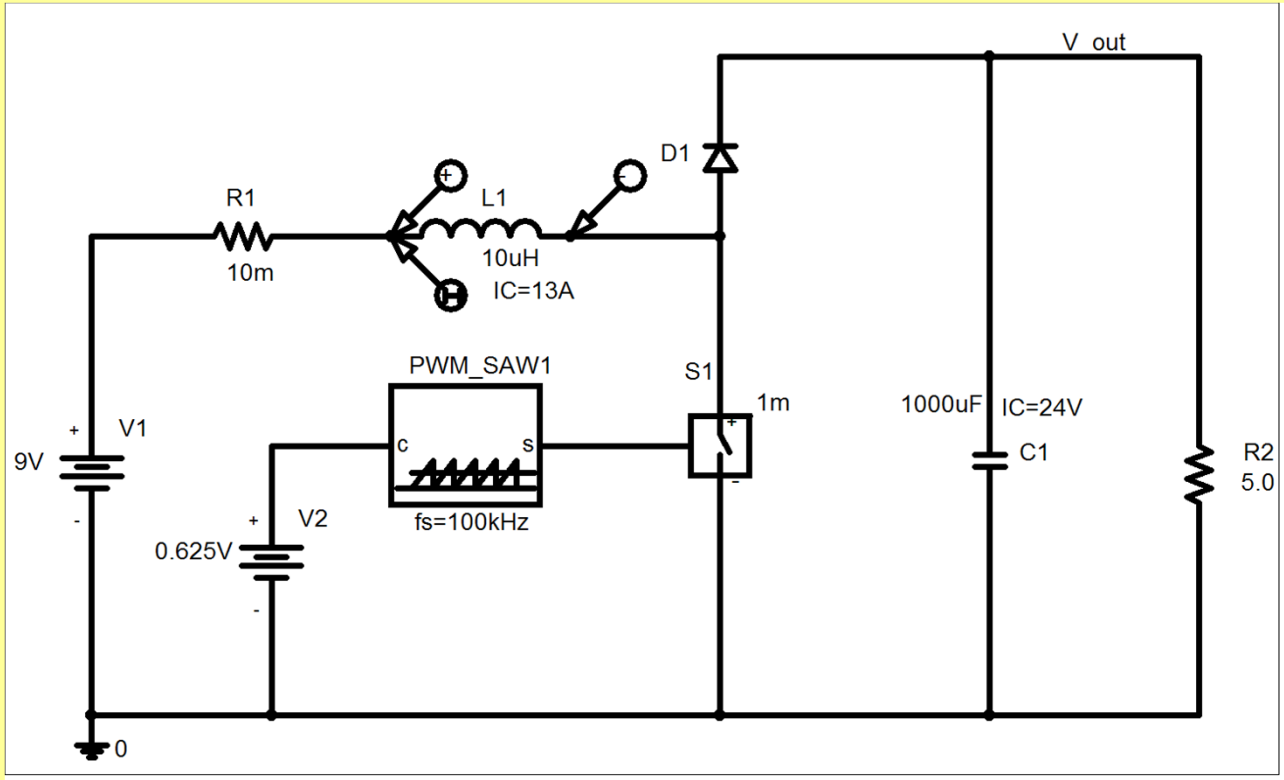
$$\Delta i_L = \frac{V_{in}}{L} D T_s = \frac{V_o - V_{in}}{L}(1-D)T_s$$

$$V_{in} I_{in} = V_o I_o$$

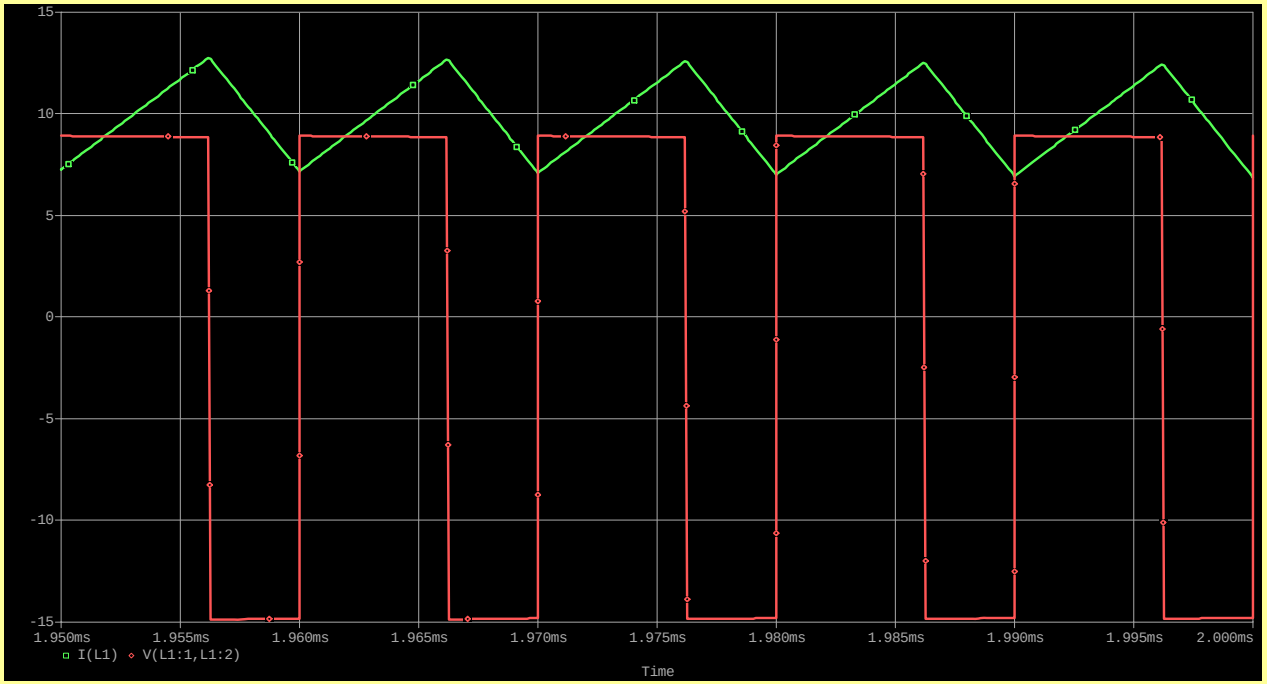
$$I_L = I_{in} = \frac{V_o}{V_{in}} I_o = \frac{I_o}{1-D} = \frac{1}{1-D}\frac{V_o}{R}$$

$$i_C(t) \simeq i_{diode,ripple}(t) = i_{diode} - I_o$$

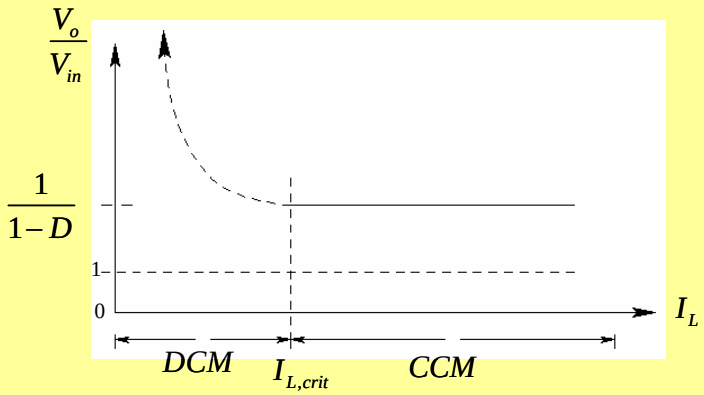
PSpice Modeling:



Simulation Results



Boost converter: voltage transfer ratio



Summary

- Boost (Step-up DC-DC) Converters
  - Applications
  - Operation in Steady State