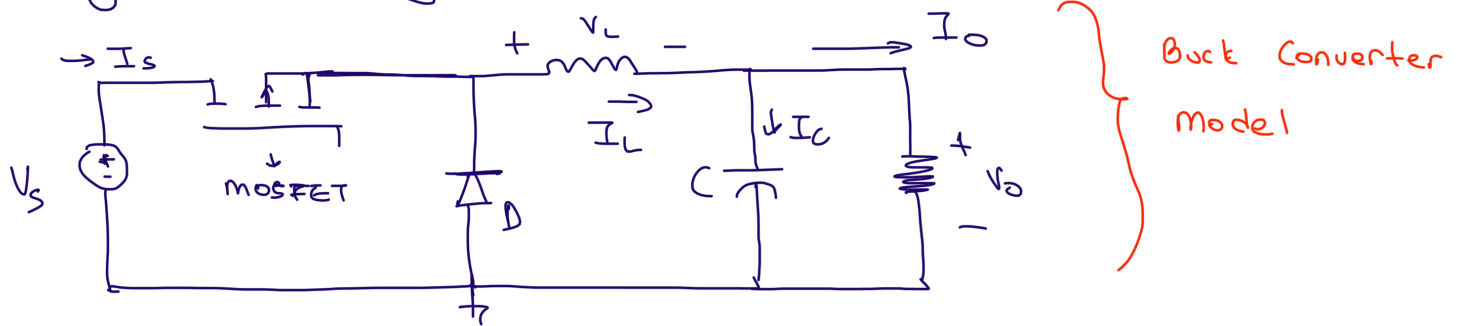


Buck Converter

→ we usually use Buck Converters when we want the output voltage to be lower than the input voltage.

→ The DC input can be derived from rectified AC or from any DC supply.



The Logic of The Buck Converter

→ The switching transistor between the input and output of the Buck Converter continually switches on and off at high frequency.

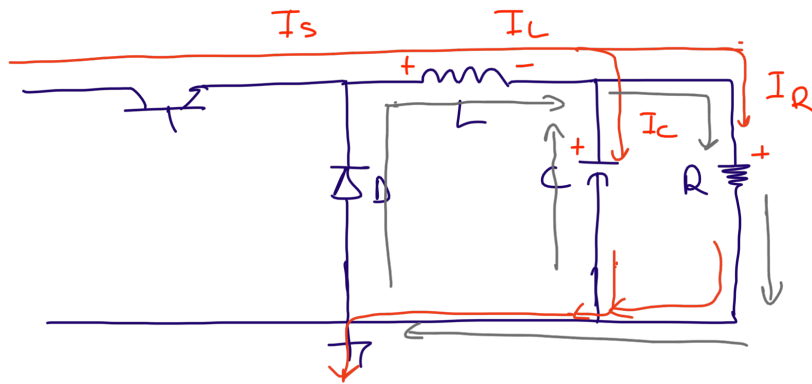
To maintain a continuous output, the circuit uses the energy stored in the inductor (L), during the on periods of the switching transistor, to continue supplying the load during the off periods.

Buck Converter Operation

Transistor switch ON / OFF

~~///~~ → Turn off

/// → Turn on



$$I_s = I_L$$

$$I_L = I_C + I_R$$

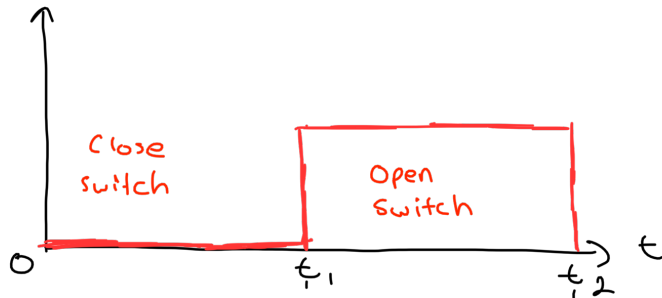
$$V_C = V_R$$

$$I_R = I_L + I_C$$

$$I_L = I_O$$

$$V_L + V_D = V_C = V_R$$

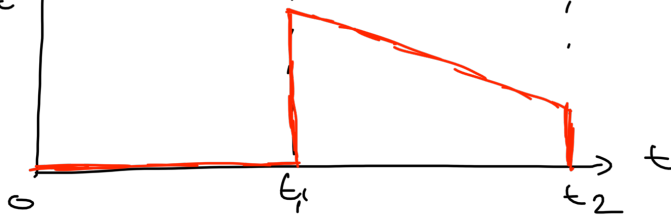
Switch



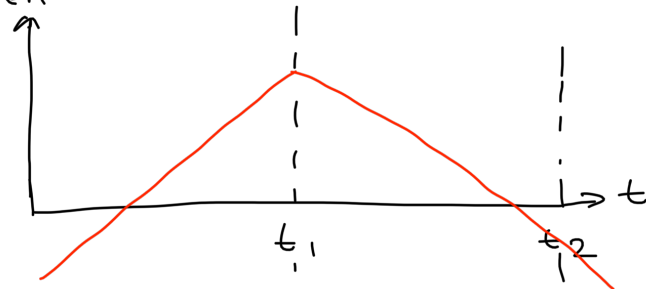
—●— → close switch

—/— → open switch

Diode current



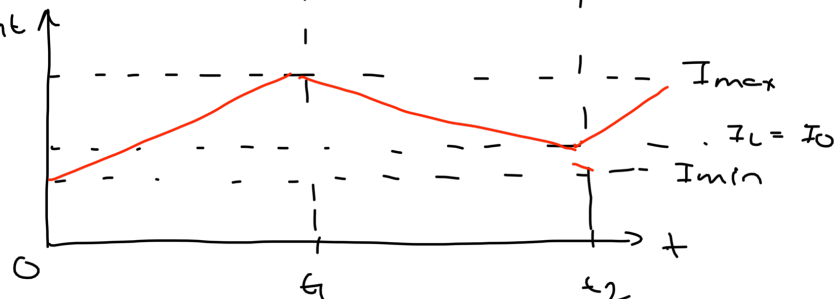
Conductor current



$$I_C = C \cdot \frac{dV_C}{dt}$$

$$V_C = \frac{1}{C} \int i_C(t) \cdot dt$$

Inductor current



$$I_L = \frac{1}{L} \int v_L(t) \cdot dt$$

$$v_L = L \cdot \frac{di}{dt}$$

Where to Use Buck Converter?

- USB - On - The - Go
- PoL Converter For Laptops
- Solar Chargers
- Quad - copters

References

- Power electronics D. W. Hart
- theengineeringprojects.com
- MCBU Power Electronics Lecture Notes
- learnabout-electronics.org

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