Inductor

Defining relationship: $V_L = L\frac{di}{dt}$, Also $\frac{di}{dt} = \frac{1}{L}V_L$

This tells us that...

1) with a constant applied voltage, the rate of change in current w.r.t. time is constant; i.e., a straight line.

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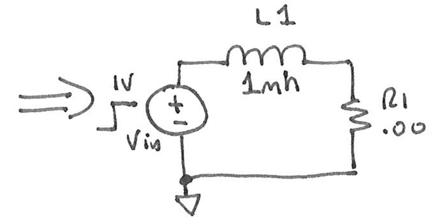
Vin ind_in gnd PULSE(0 1v 0ns 1ps 1ps 25ms 50ms)
L1  ind_in  tie  1mh
R1   tie   gnd  0.001  ; sense resistor to determine current
.control
   tran 1us 10ms
   plot  v(tie)/.001  ; plot current through inductor
.endc
.end
```



if $L = 1\times10^{-3}$ H
$V_{in} = 1V$

$$\frac{di}{dt} = \frac{1}{L}V_L \quad (V_{in} \approx V_L)$$

$$\frac{di}{dt}\left(\frac{A}{s}\right) = \frac{1}{1\times10^{-3}\ \frac{Vs}{A}} \cdot 1v$$

$$\frac{di}{dt}\left(\frac{A}{s}\right) = 1000\frac{A}{s} \text{ or } \frac{10A}{10ms}$$

2) If the current through the inductor is not changing, the voltage across the inductor is zero. ∴ The inductor must be a short circuit to DC.