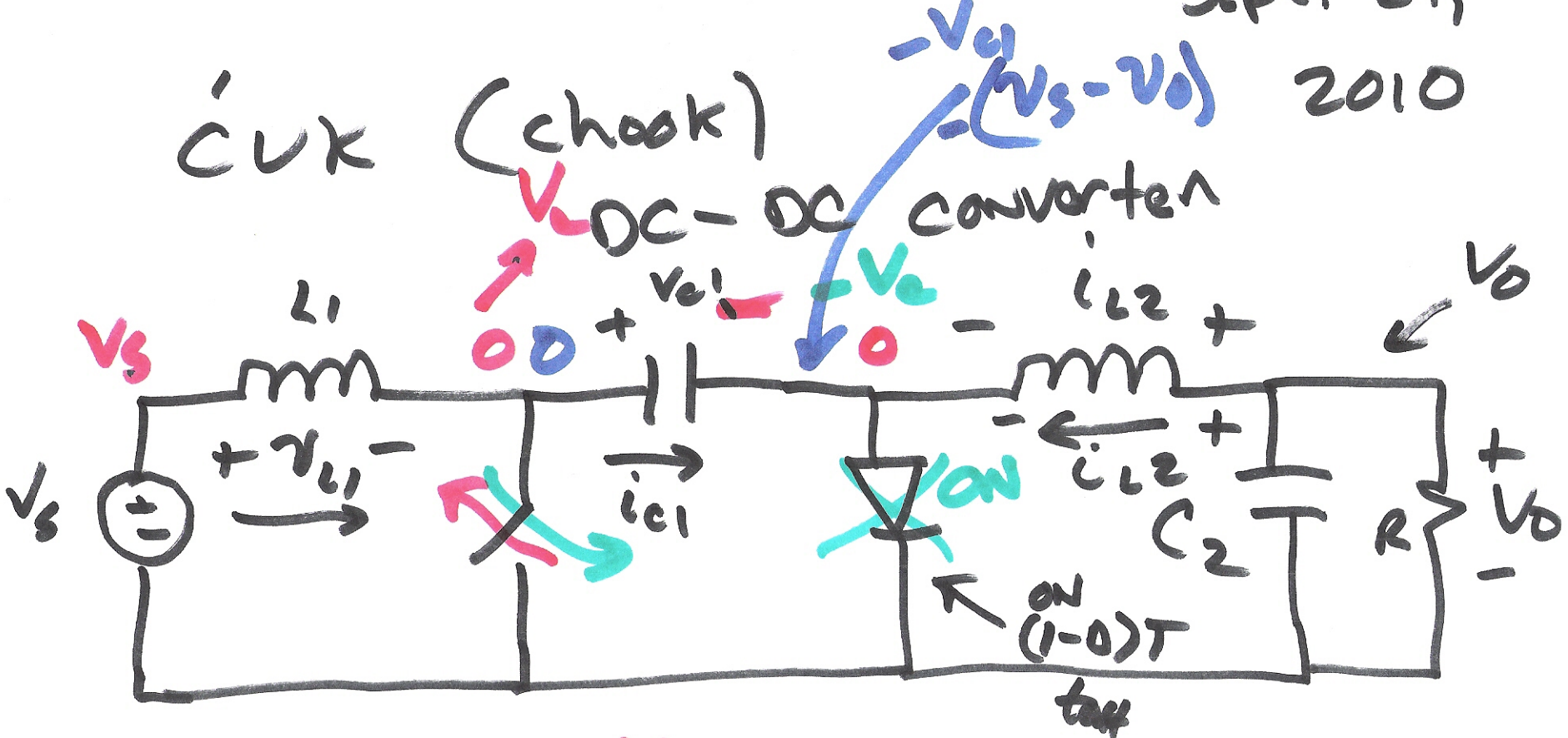
ECE 5/472 Power Electronics

BOISE STATE UNIVERSITY

Lecture 15 Sept. 29, 2010

Ćuk (chook) DC-DC converter



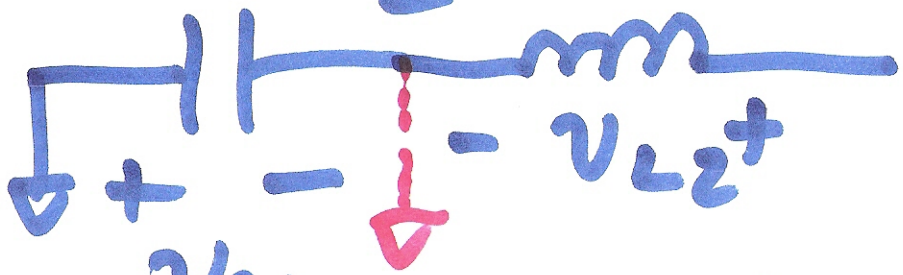
$$\Delta i_{L1} = \frac{V_s}{L_1} \cdot DT = 0$$

$$\Delta i_{L2} = \frac{v_o}{L_2} \cdot (1-D)T$$

$$v_s - v_{L1}^{\,0} - v_{C1} + v_{L2}^{\,0} - v_o = 0$$

$$\boxed{v_{C1} = v_s - v_o}$$

$-(v_s - v_o) = v_o - v_s$



$v_{L2} = v_o - (v_o - v_s)$

$v_{L2} = v_o$

$= v_s$

$t_{on} \rightarrow DT$

Switch on!

2)

$v_{c1} = v_s - v_o$

$(1-D)\cdot T$

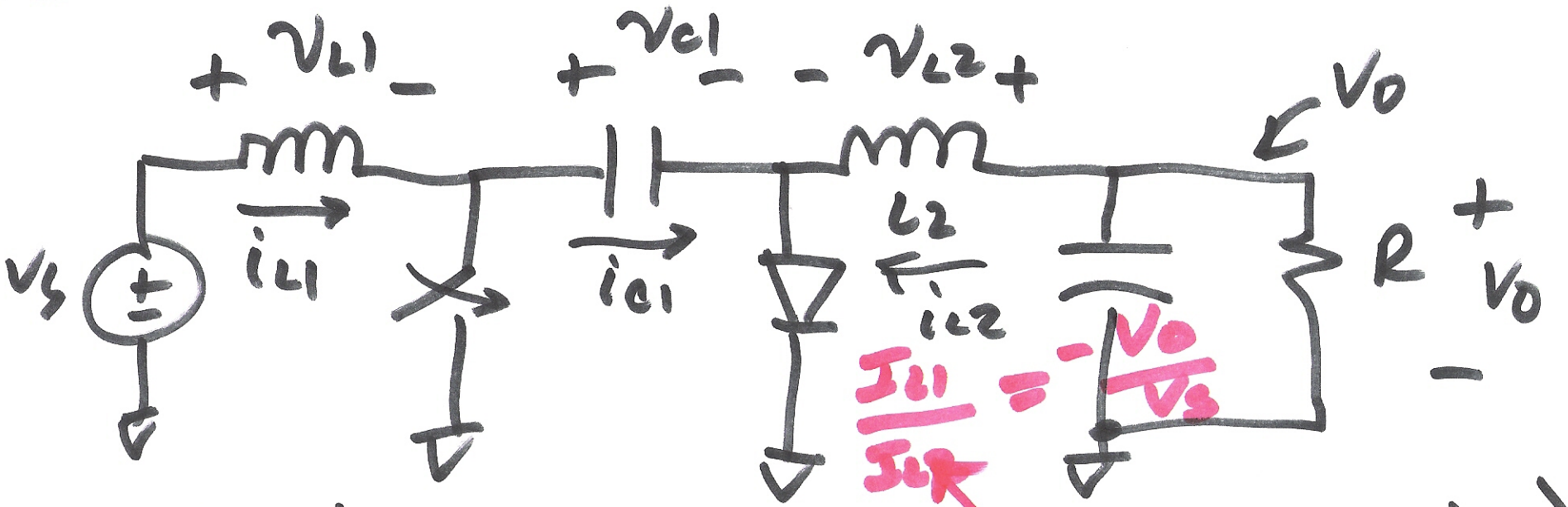
$v_{L1} = v_s - (v_s - v_o)$

$= \underline{\underline{v_o}} \quad \{(1-D)\cdot T\}$

$v_{L1} = \underline{\underline{v_s}} \quad \{DT\}$

3)

ĆUK



$\frac{I_{L1}}{I_{L2}} = \frac{-V_o}{V_s}$

closed

$i_{C1} = -i_{L2}$

$V_s \cdot i_{L1} = V_o \cdot (-i_{L2})$

$-I_{L2}$

$i_{C1}|_{close} \cdot DT = -i_{C2open}(1-D)T$

I_{L1}

open

$i_{C1} = i_{L1}$

$\frac{I_{L1}}{I_{L2}} = \frac{D}{1-D}$

$\frac{-V_o}{V_s} = \frac{D}{1-D}$

4)