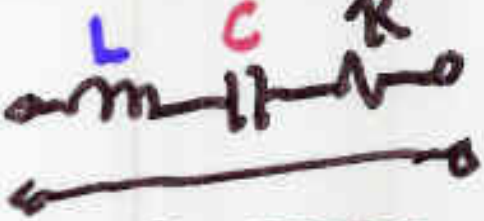
Choices for high Q circuits

#1 $Z_L > R$ Series $R < Z_0$

#2 $Z_C < R$ (Both Mixed Parallel) $R > Z_0$

Topology of Resonance

(1) Pure Series $R < Z_0$

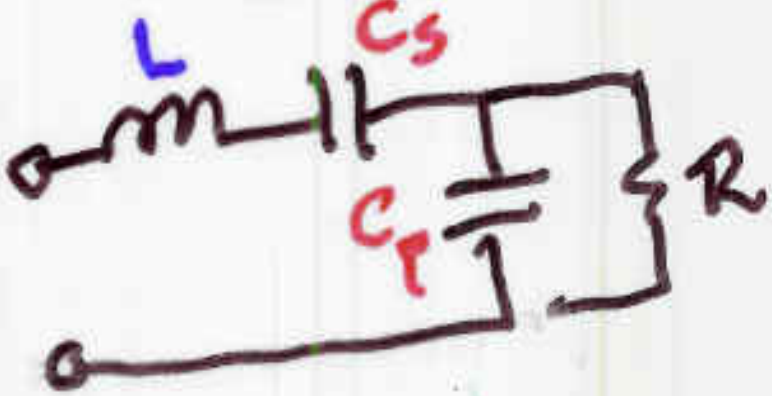


(2) Pure Parallel $R > Z_0$

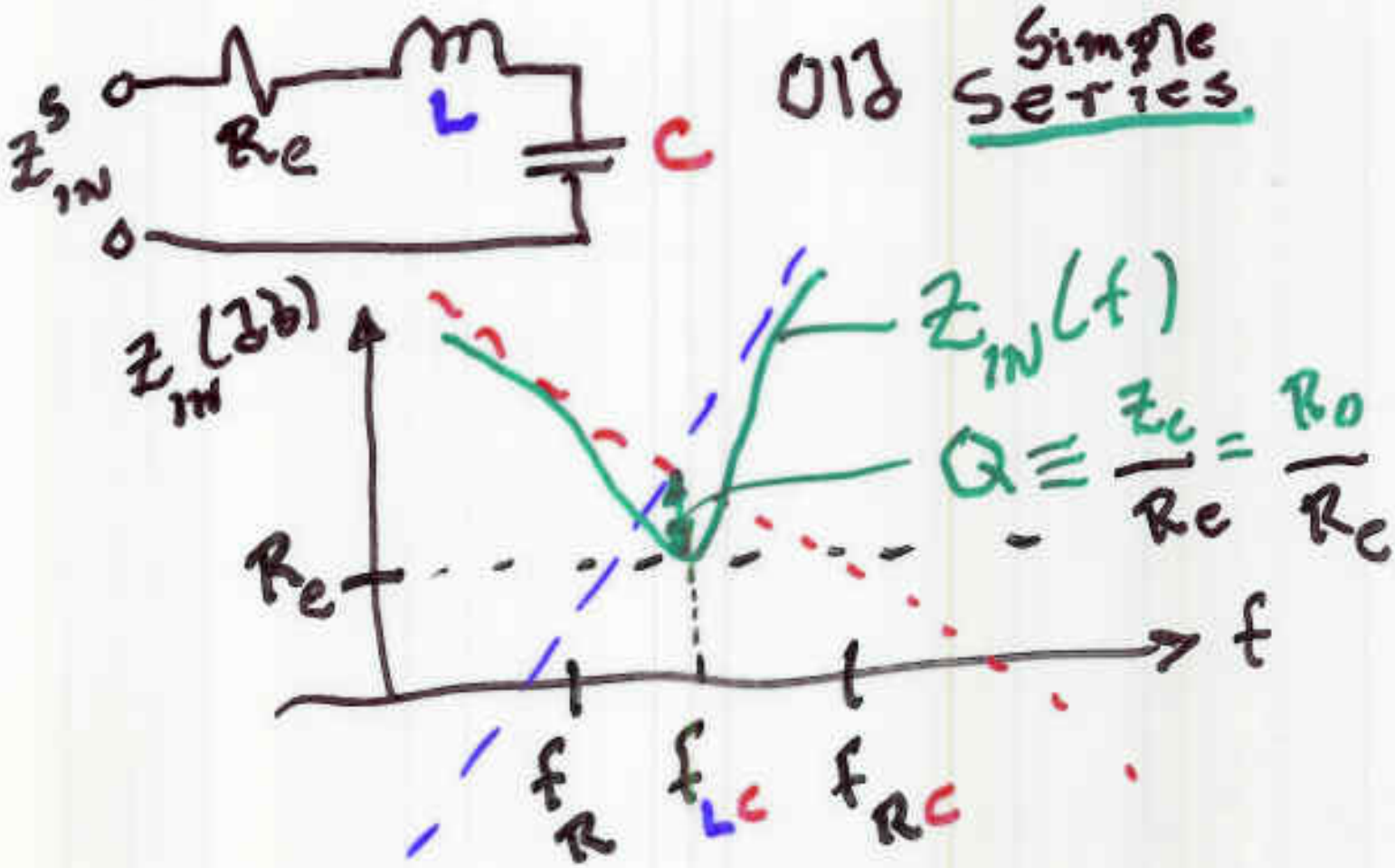
(3) Mixed:

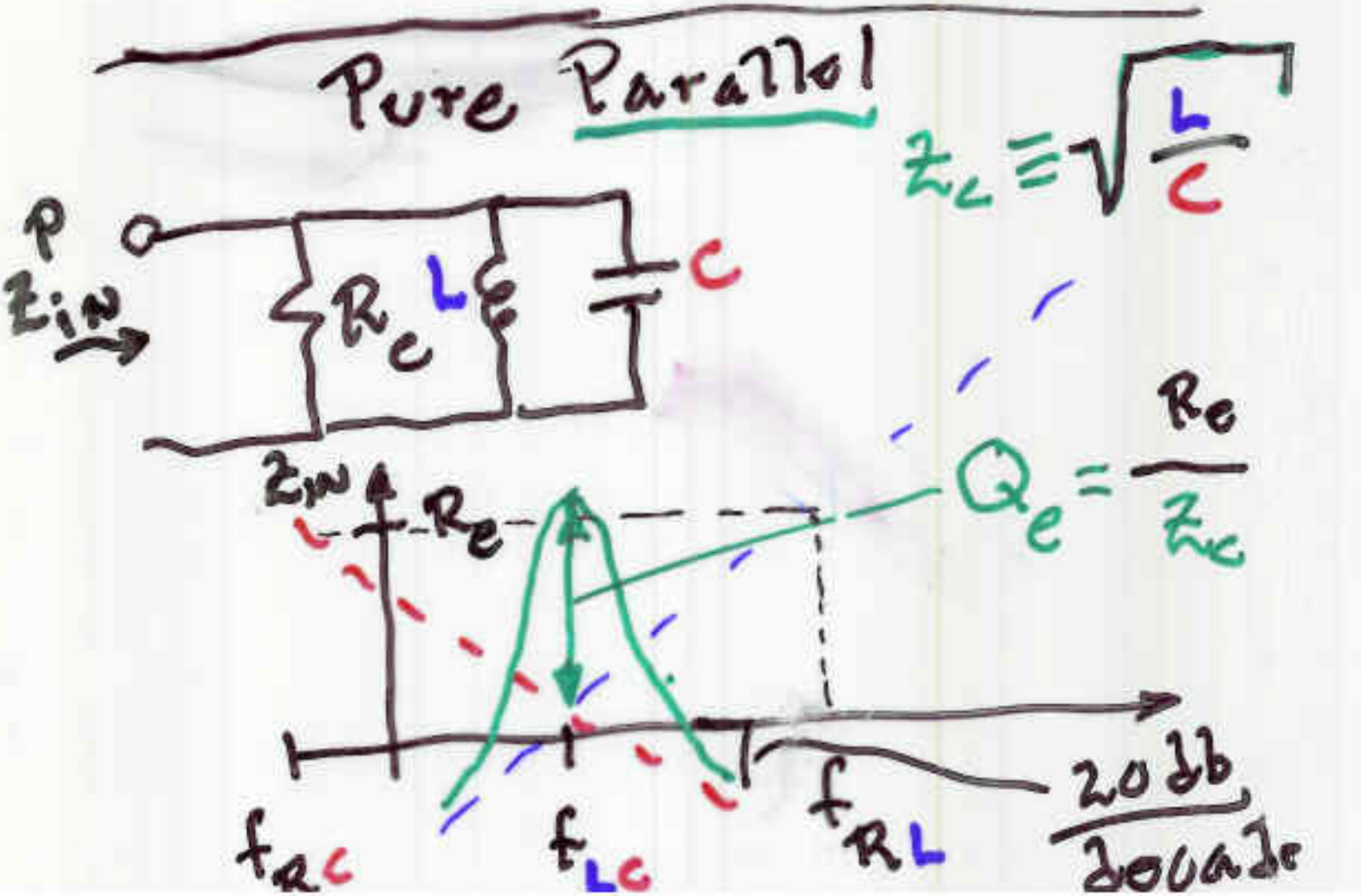
$R > Z_0$

(4) Special Purpose



$R = 0$ (V5) $R = 0$


Old Simple Series
S
Z_{IN}
R_e
L
C
$Z_{IN}(db)$
$Z_{IN}(f)$
$Q \equiv \frac{Z_c}{R_e} = \frac{R_0}{R_c}$
R_e
f
f_R
f_{LC}
f_{RC}


Pure Parallel
$Z_L \equiv \sqrt{\frac{L}{C}}$
P
Z_{IN}
R_c
L
C
Z_{IN}
R_e
$Q_e = \frac{R_e}{Z_L}$
f_{RC}
f_{LC}
f_{RL}
20db
decade

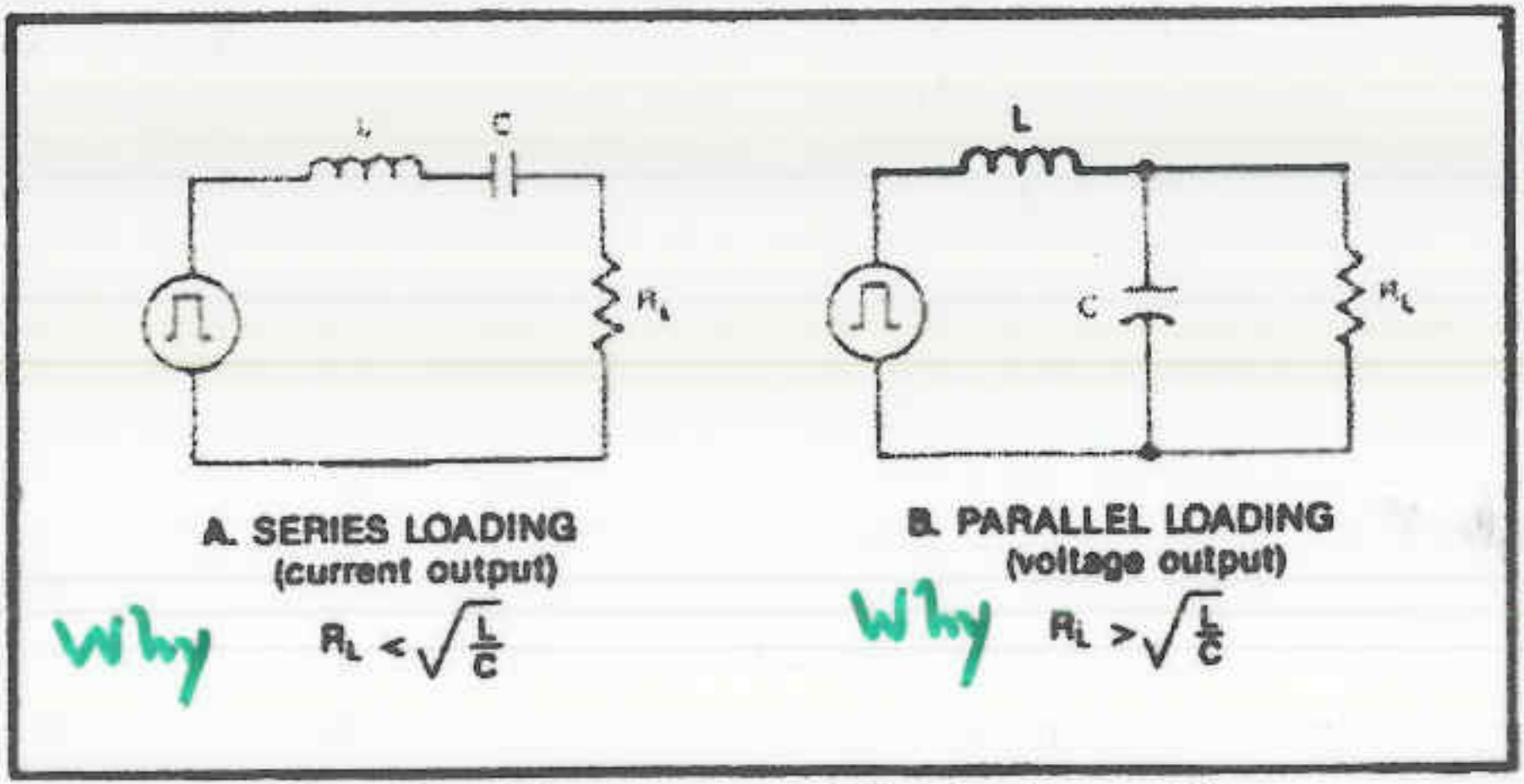
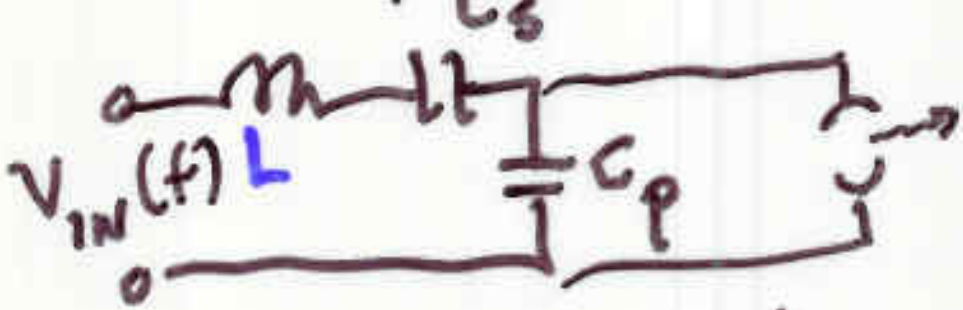


Fig. 9 - Resonant Mode Loading

Flourescent Light: -(;)-

How to get V_{off} large
V_{ON} small

"naturally" via resonant circuit



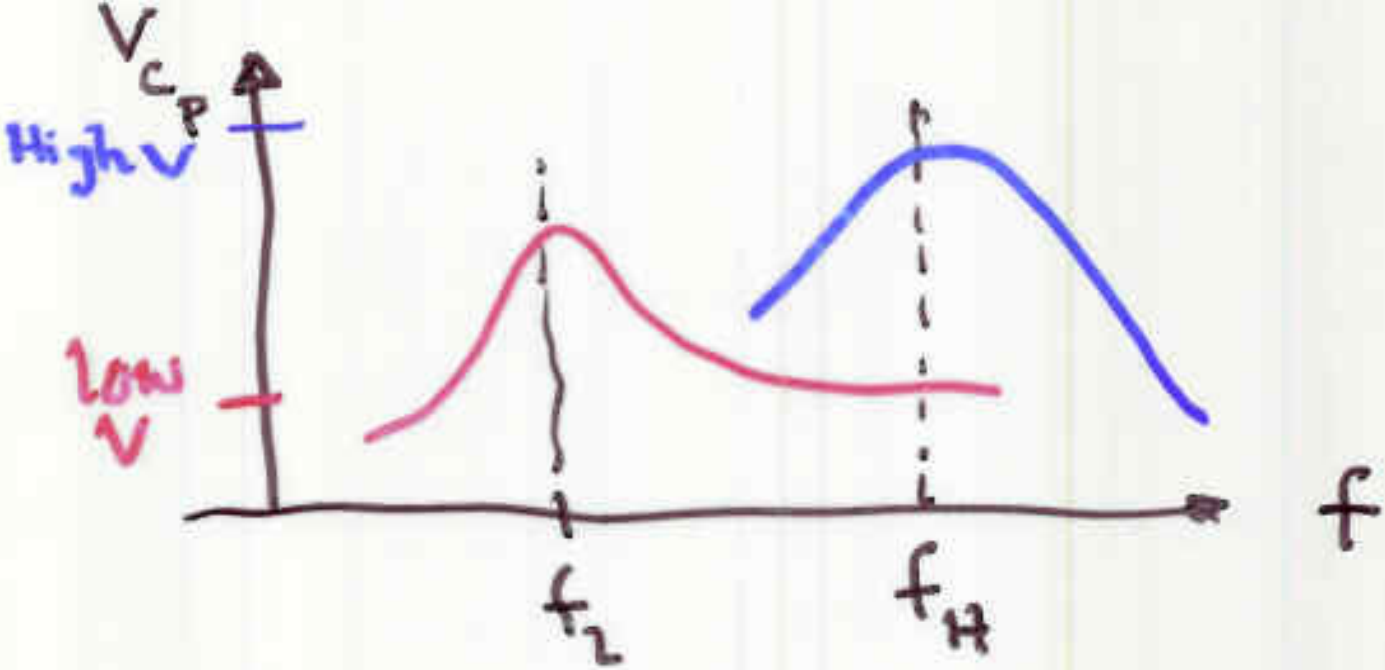
$$f_R(\text{light off}) = \frac{1}{\sqrt{L C_{eff}}} = f_{High}$$

(C_{eff}: smaller than C_p)

$$f_R(\text{light on}) \simeq \frac{1}{\sqrt{L C_s}} = f_{Low}$$

$V_{IN}(f)$ Near resonance

$$V_C \simeq Q V_{in}$$



Sweep f starting $f > f_H$

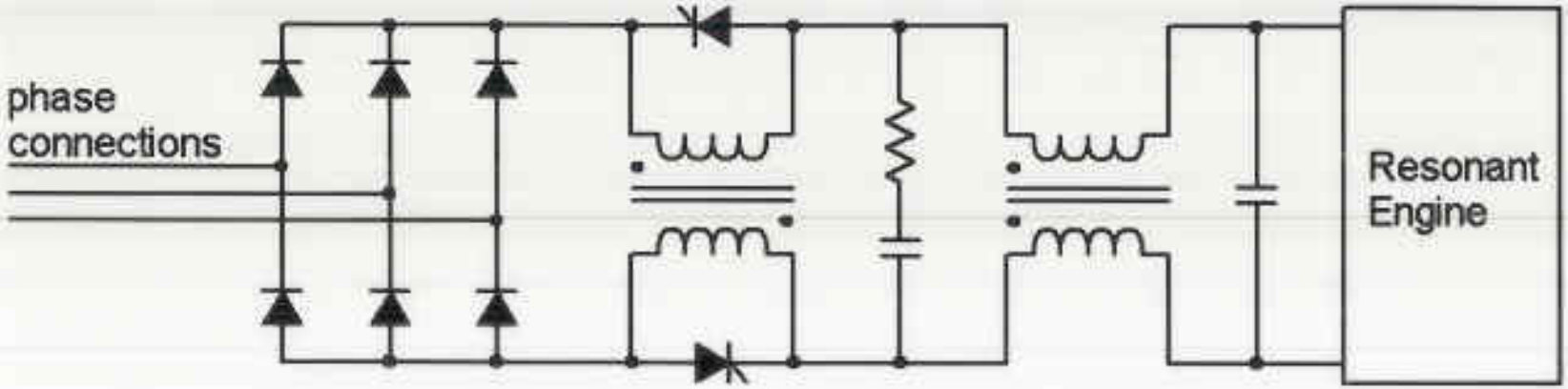
$f = f_H$ V_{cp} is max

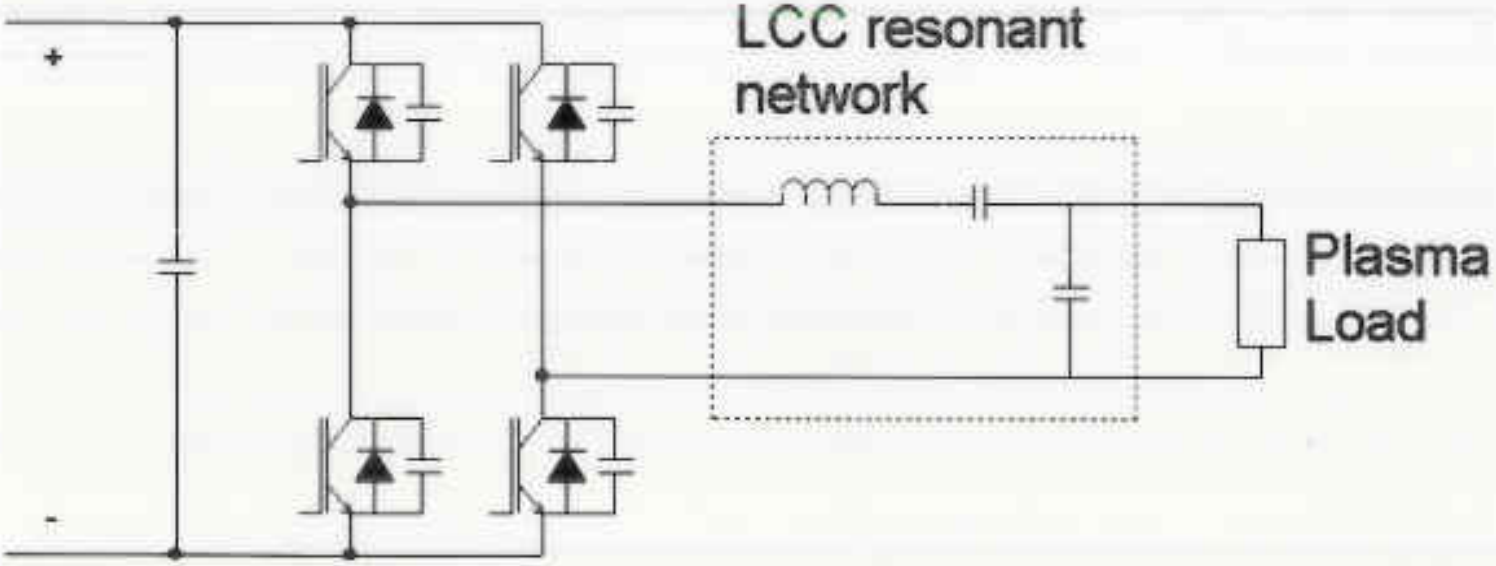
CFL breakdown shorts

C_p: circuit moves to red

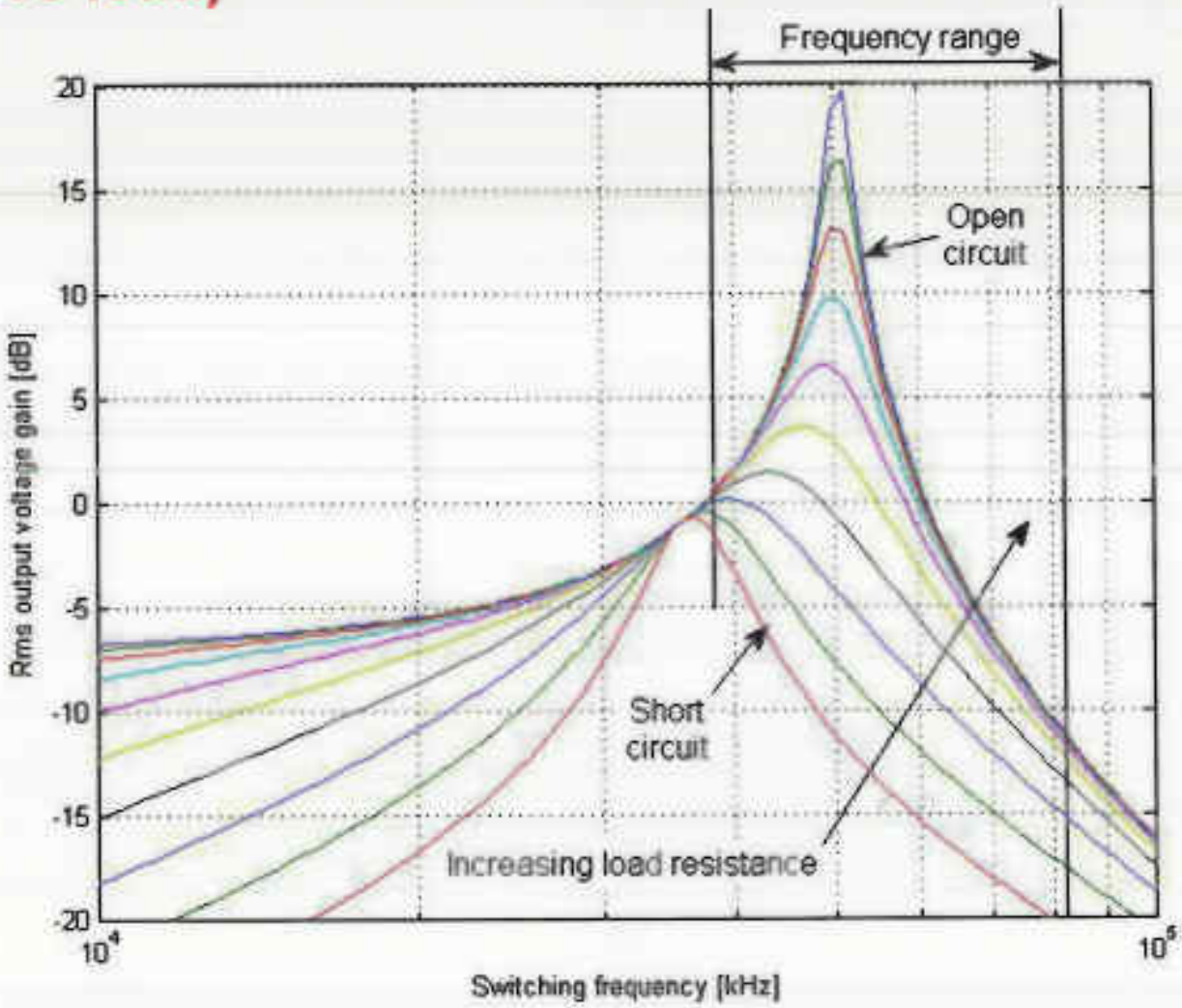
f_L curve V_{cp} ↓

LCC Resonant Supply

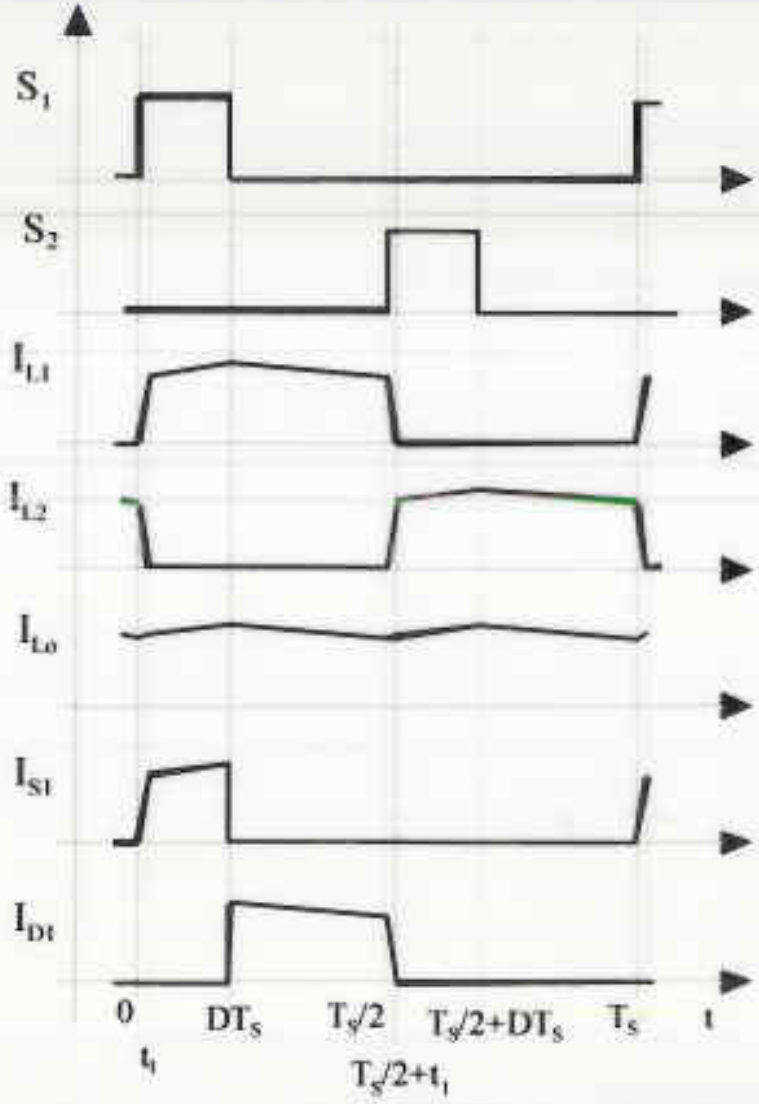


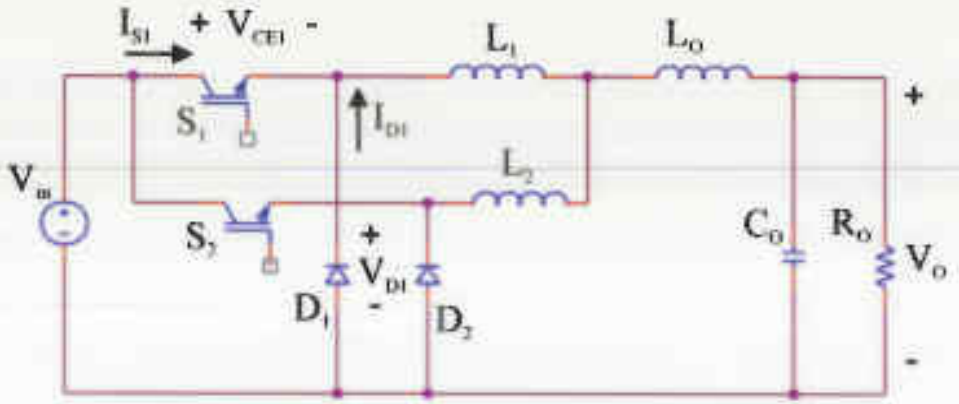


Voltage Gain – Resonant supply with LCC tank (Resistive load)



Interleaved ZCT converter operation (ideal waveforms)





Diode recovery slope:

$$V_{in} / (L_1 + L_2)$$

Transition interval:

$$t_1 = \frac{I_{Lo}(L_1 + L_2)}{V_{in}}$$