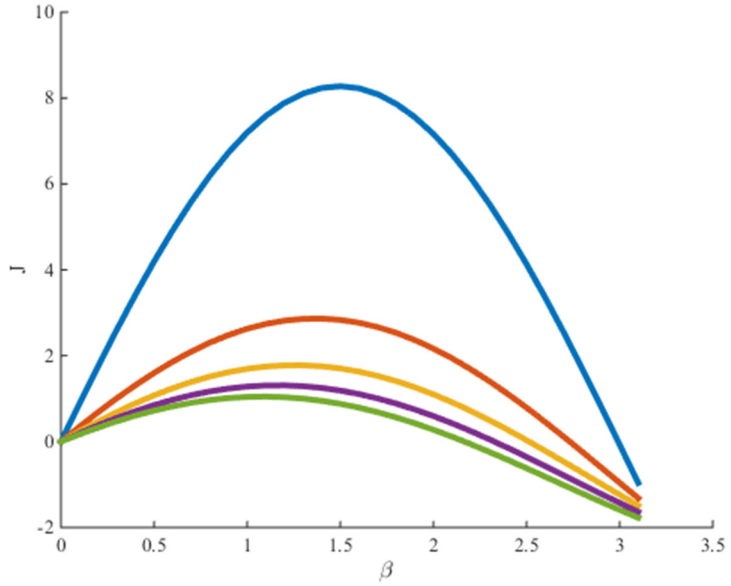
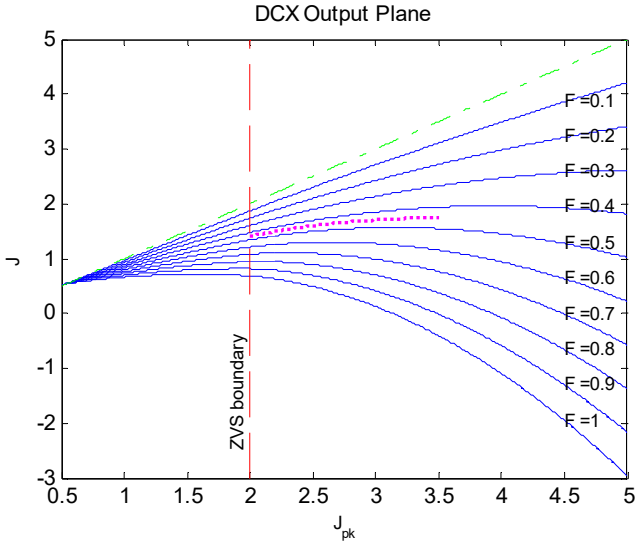
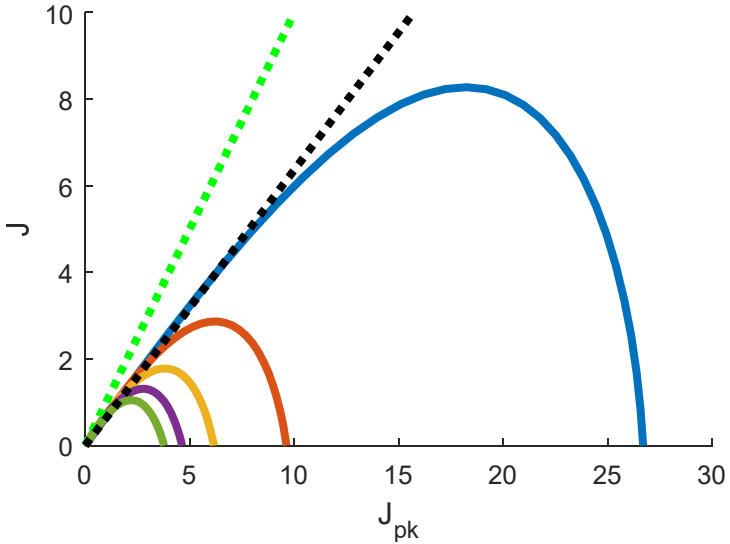
SRC Control Trajectory



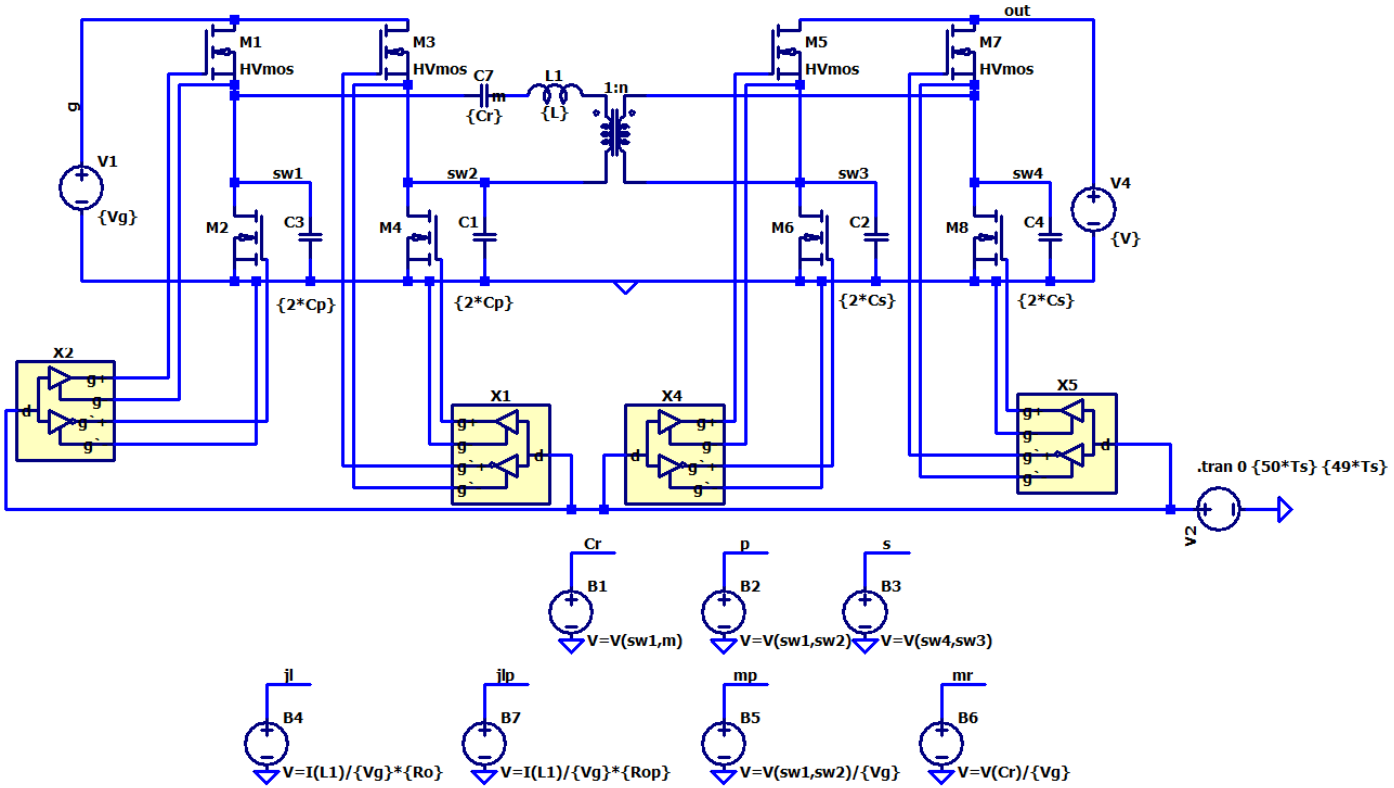
SRC Current Stress





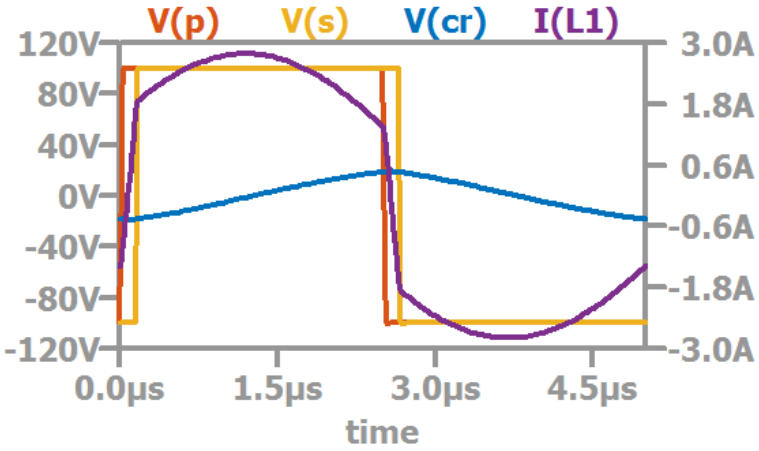
Example Simulation

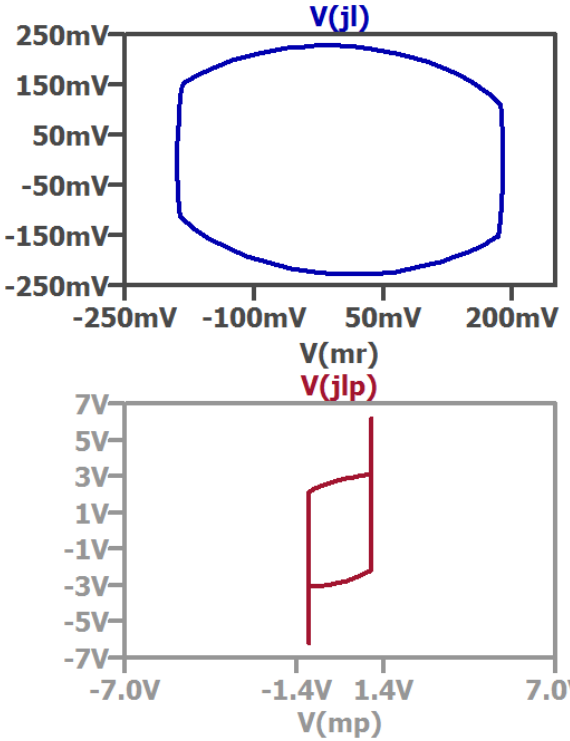
.param Cr={150n} Ro={(L/Cr)**.5} td=70n phi={Ts/2+150n} Rop={(L/Cp)**.5}
.param fs=750k Ts={1/fs} Vg=100 V={Vg} C={100u} Cp=200p Cs={Cp} L={10u}



SRC Simulation

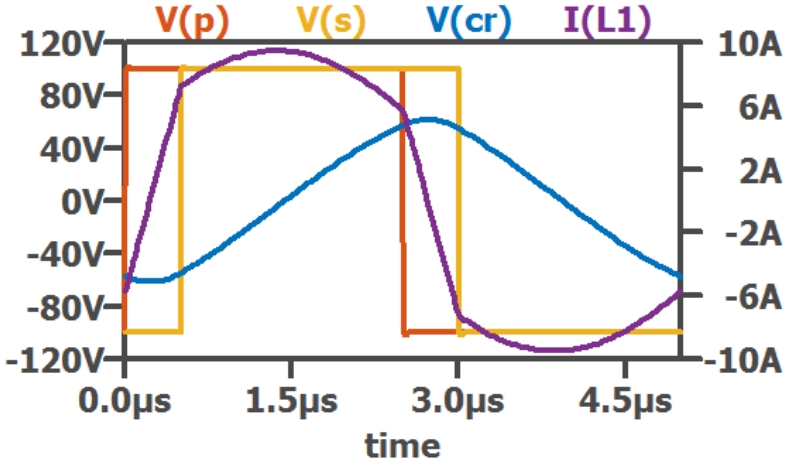
I_{out} = 2A
f_s = 200kHz
f_o = 130kHz
V_g = 100V
V_{out} = 100V

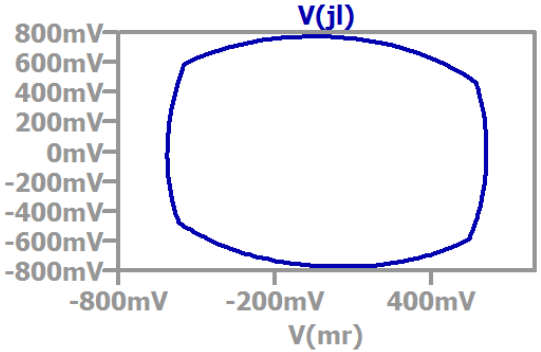


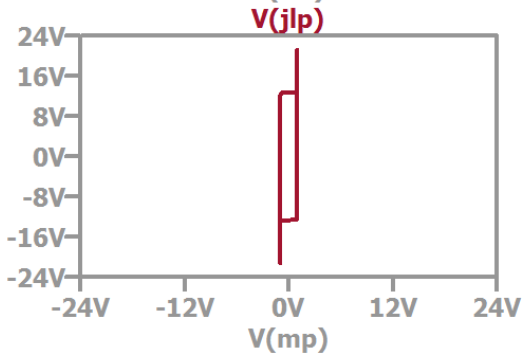


SRC Simulation

I_{out} = 6.5A
f_s = 200kHz
f_o = 130kHz
V_g = 100V
V_{out} = 100V

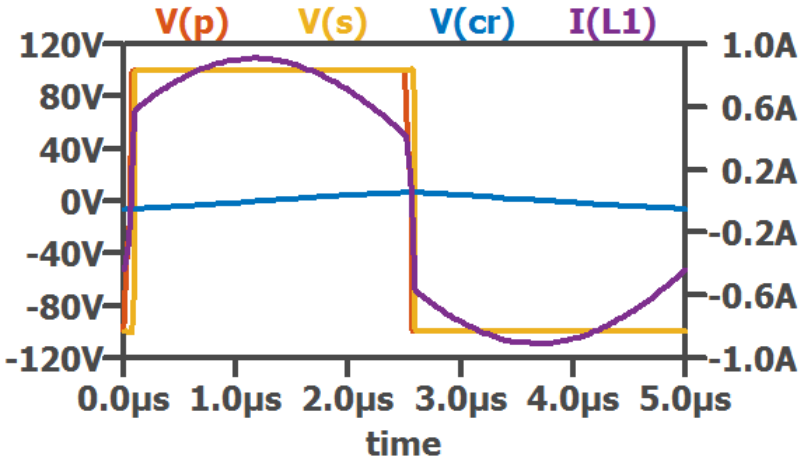


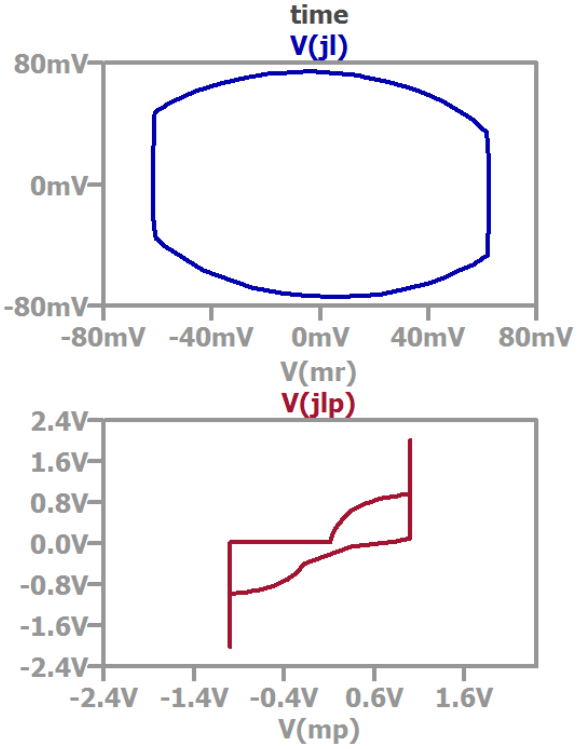




SRC Simulation

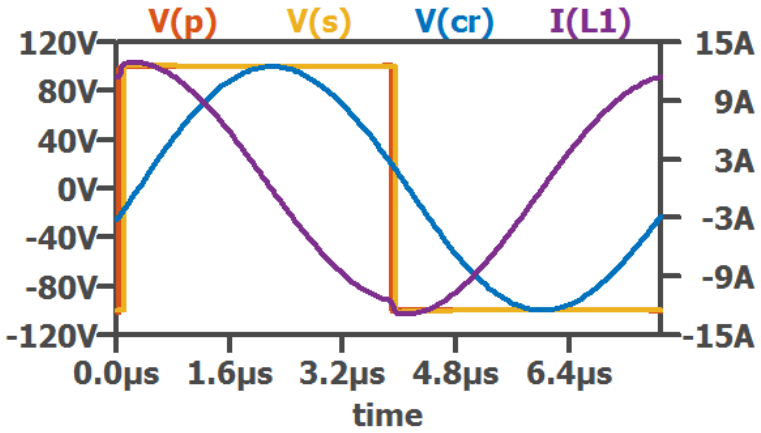
I_{out} = 500mA
f_s = 200kHz
f_o = 130kHz
V_g = 100V
V_{out} = 100V

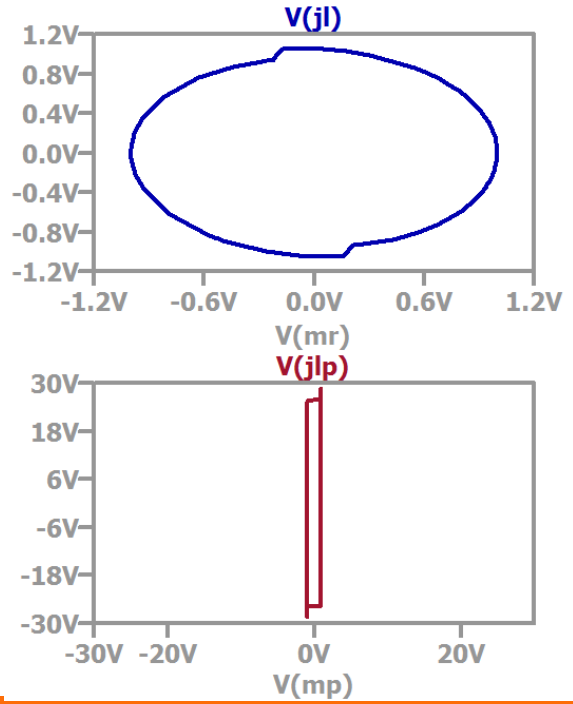




SRC Simulation

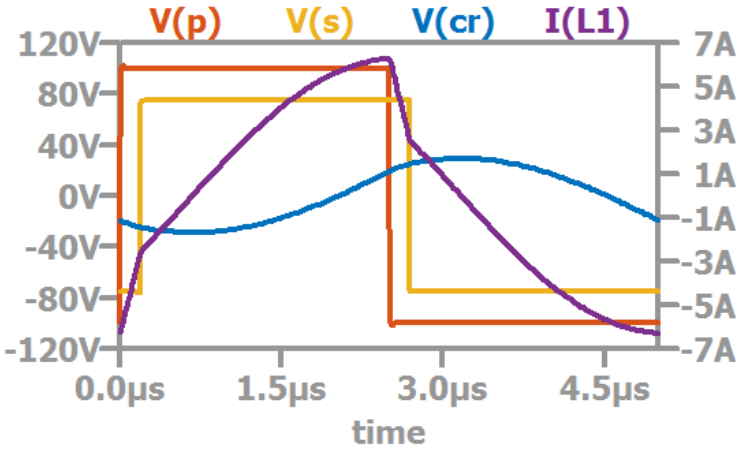
I_{out} = 1.2A
f_s = 130kHz
f_o = 130kHz
V_g = 100V
V_{out} = 100V

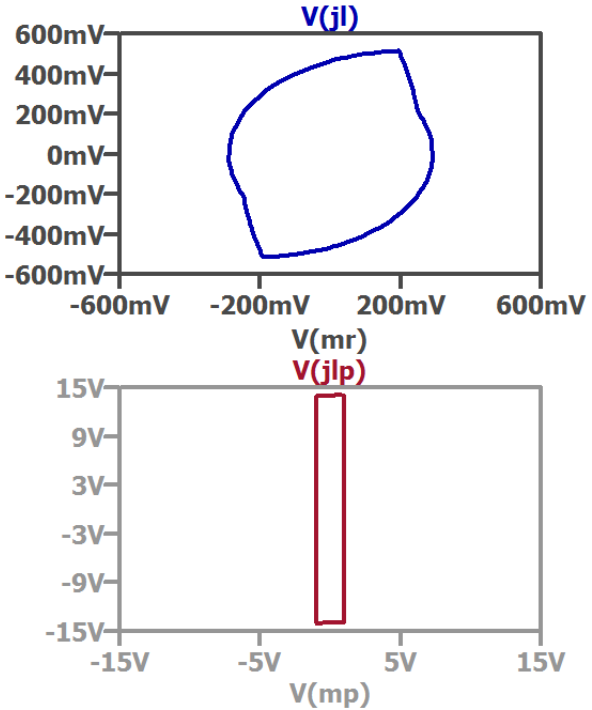




SRC Simulation

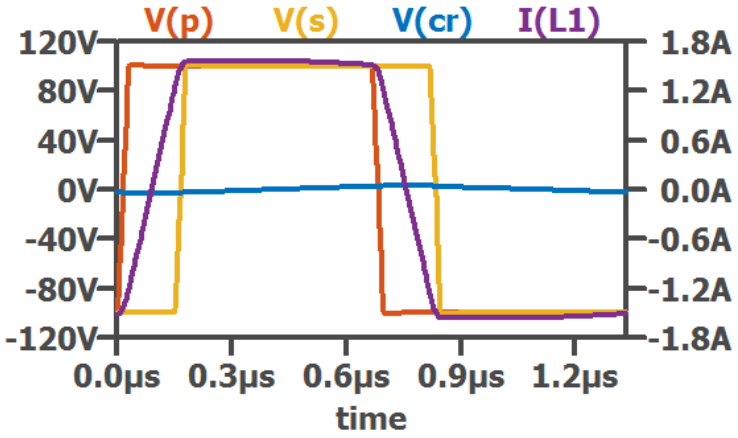
I_{out} = 3A
f_s = 200kHz
f_o = 130kHz
V_g = 100V
V_{out} = 75V

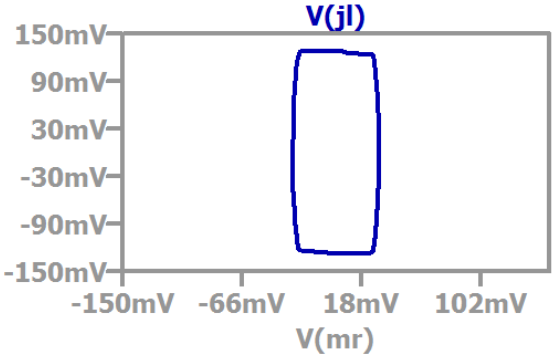


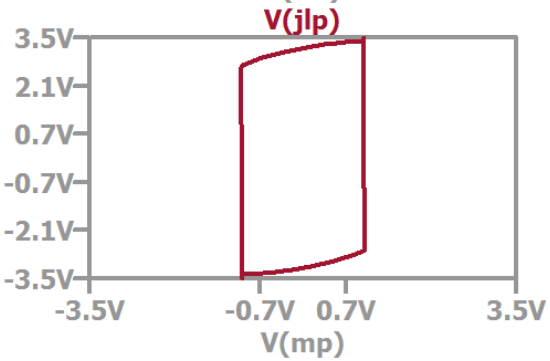


SRC Simulation

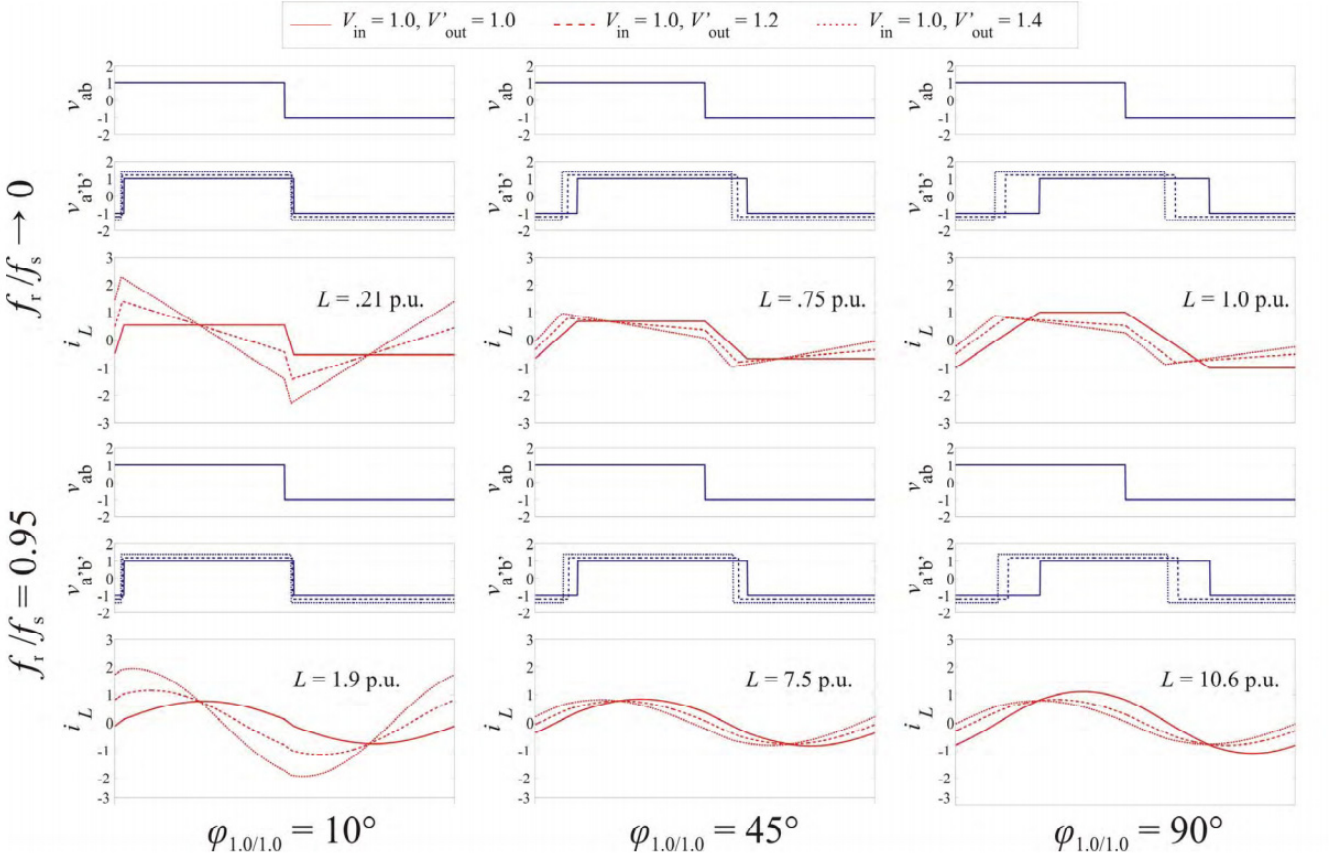
I_{out} = 1A
f_s = 750kHz
f_o = 130kHz
V_g = 100V
V_{out} = 100V



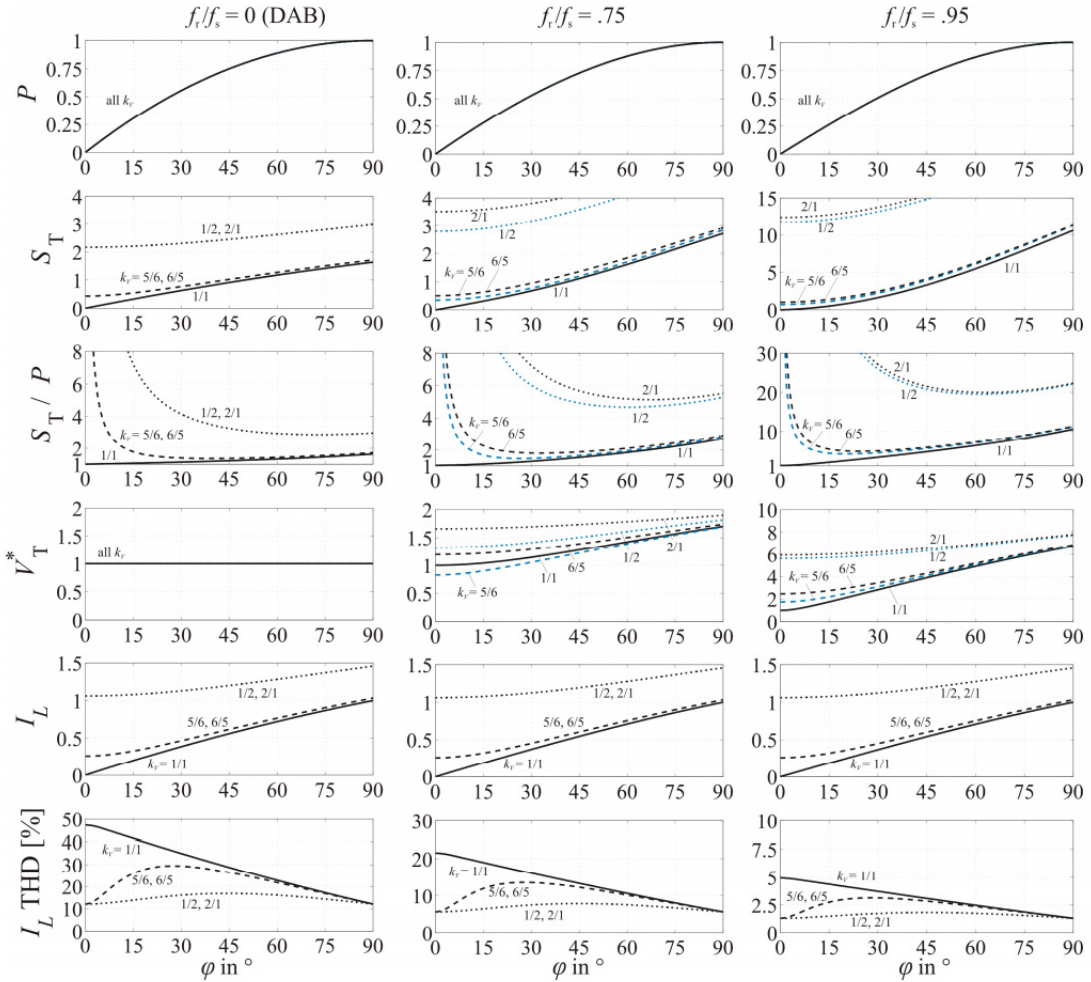




DAB vs SRC



R. Lenke, F. Mura and R. W. De Doncker, "Comparison of non-resonant and super-resonant dual-active ZVS-operated high-power DC-DC converters,"


$f_τ/f_s = 0$ (DAB)
$f_τ/f_s = .75$
$f_τ/f_s = .95$
P
S_T
S_T / P
V^*_T
I_L
I_L THD [%]
all $k_τ$
1/2, 2/1
$k_τ$= 5/6, 6/5
1/1
2/1
1/2
5/6, 6/5
$k_τ$= 1/1
$k_τ$= 5/6
φ in °

DAB vs SRC: Conclusions

DAB

+ Smaller resonant tank
+ Smaller RMS currents
+ Wider Soft-switching range

SRC

+ Can be designed with larger XF inductance
+ Lower AC winding losses
+ Reduced device turn-off losses

R. Lenke, F. Mura and R. W. De Doncker, "Comparison of non-resonant and super-resonant dual-active ZVS-operated high-power DC-DC converters,"