Closed-Form Solution

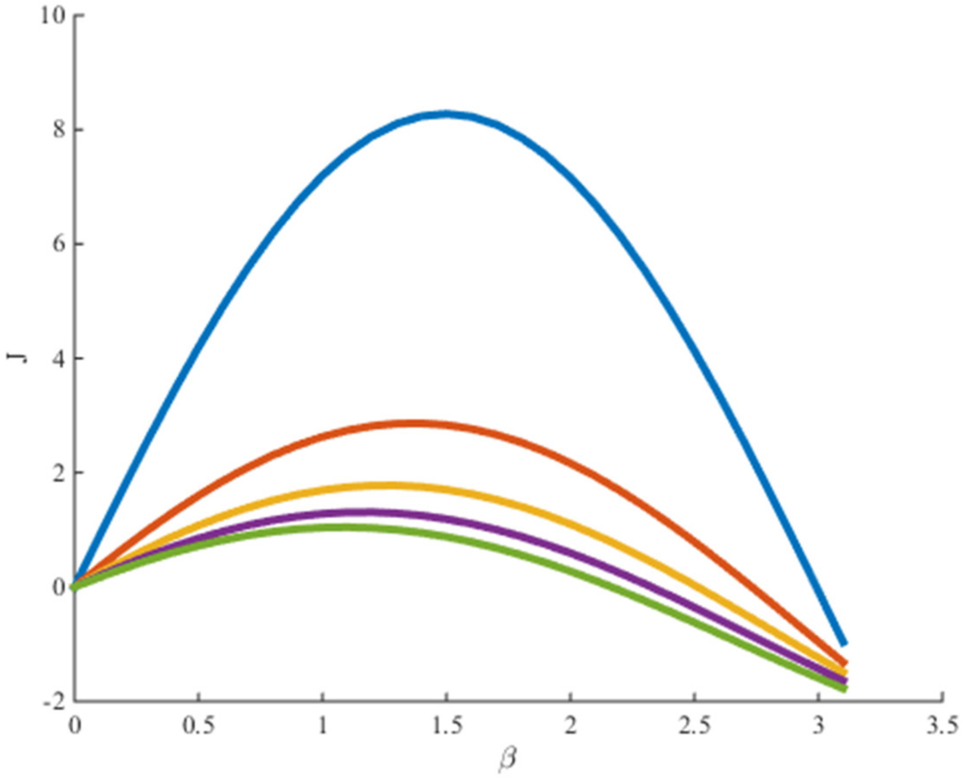
$$J = \frac{F}{\pi} 2 m_1$$

$$\frac{\pi}{F} = \alpha + \beta$$

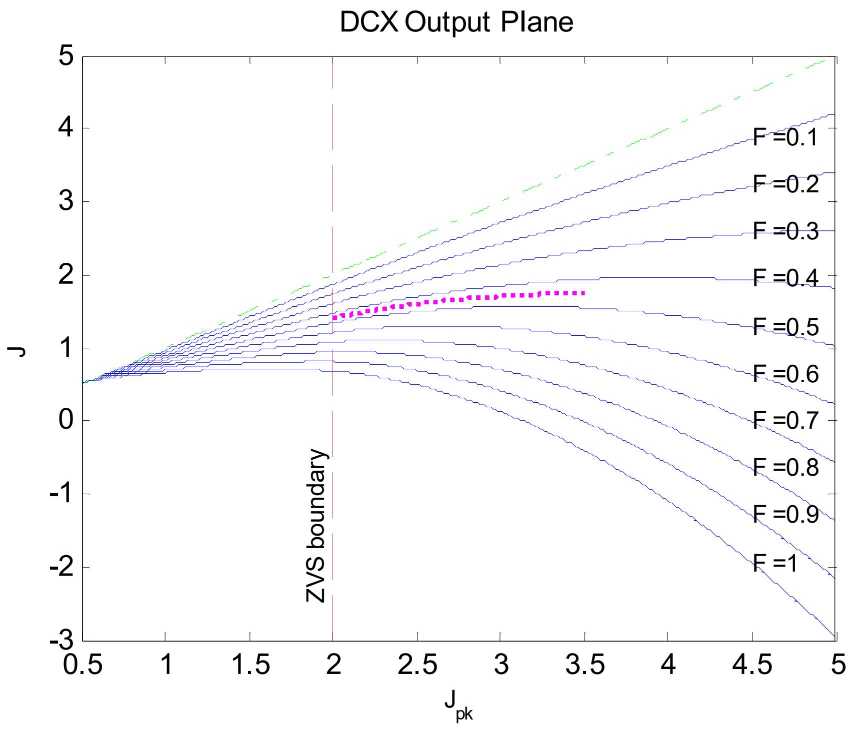
$$\begin{cases} \alpha = 2\tan^{-1}\left(\dfrac{m_1}{J_1}\right) \\ \beta = 2\tan^{-1}\left(\dfrac{J_1}{2+m_1}\right) \end{cases}$$

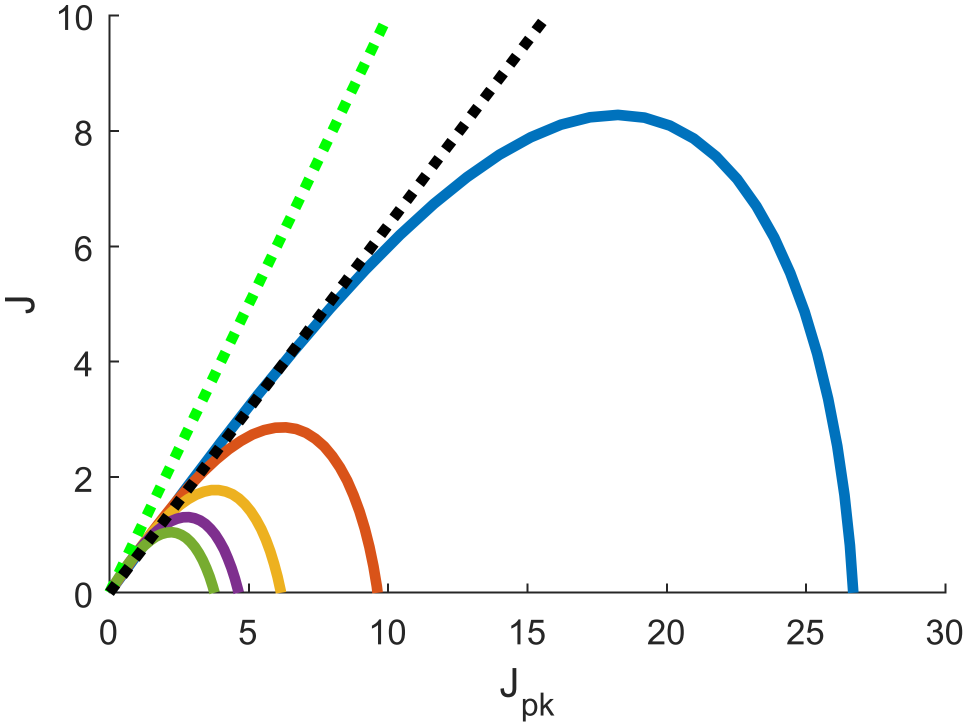
$$m_1 = \tan\left(\frac{\alpha}{2}\right) J_1$$

SRC Control Trajectory

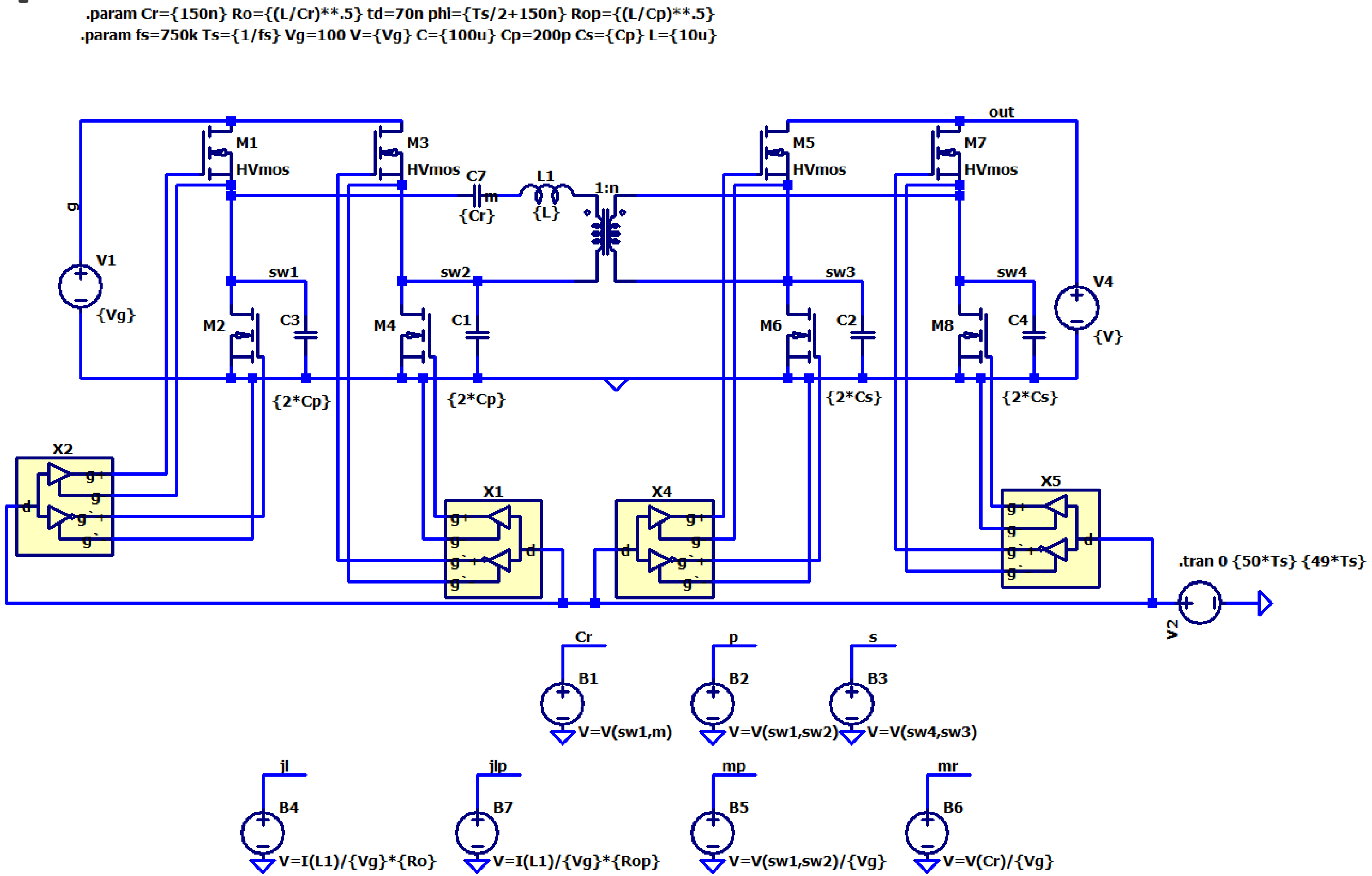


SRC Current Stress



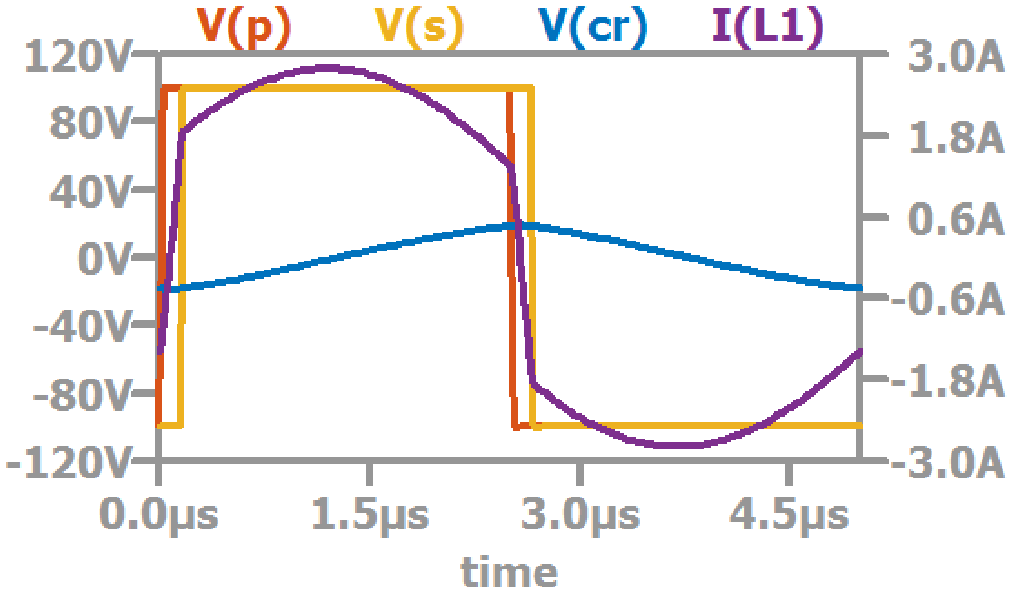


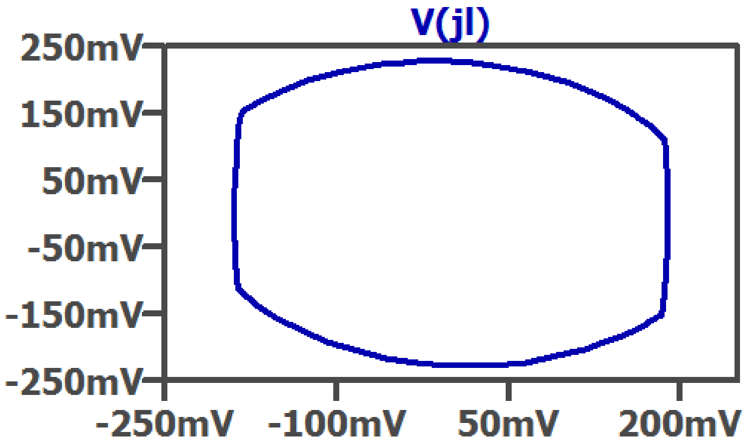
Example Simulation

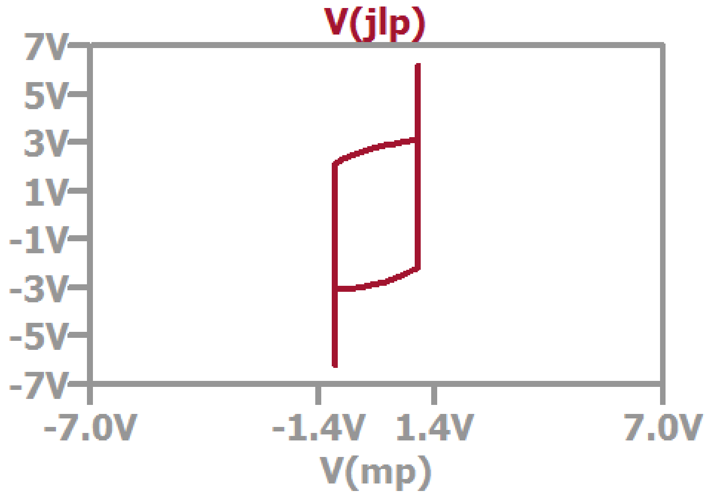


SRC Simulation

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

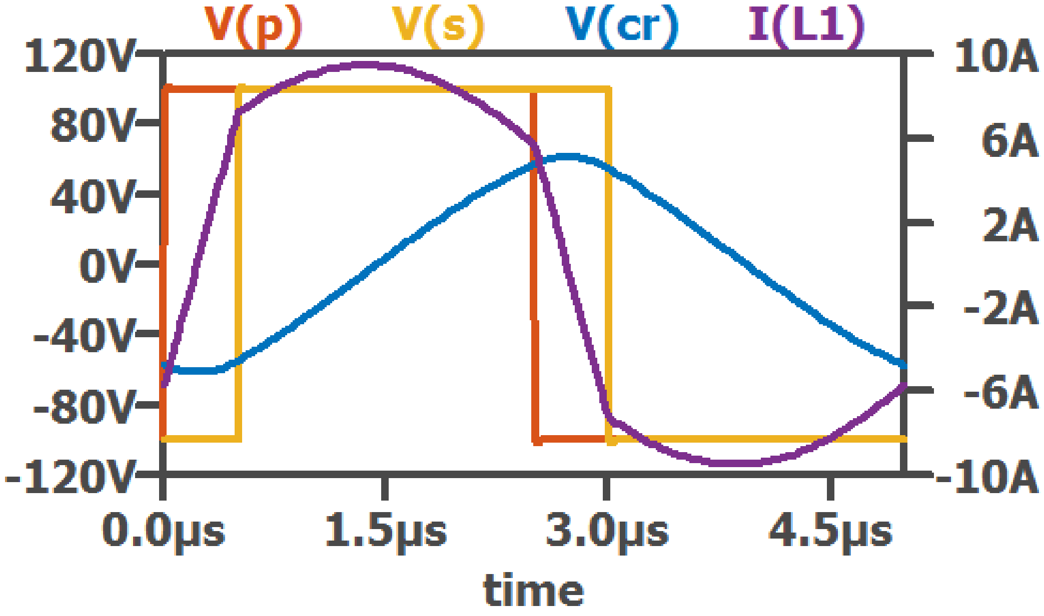


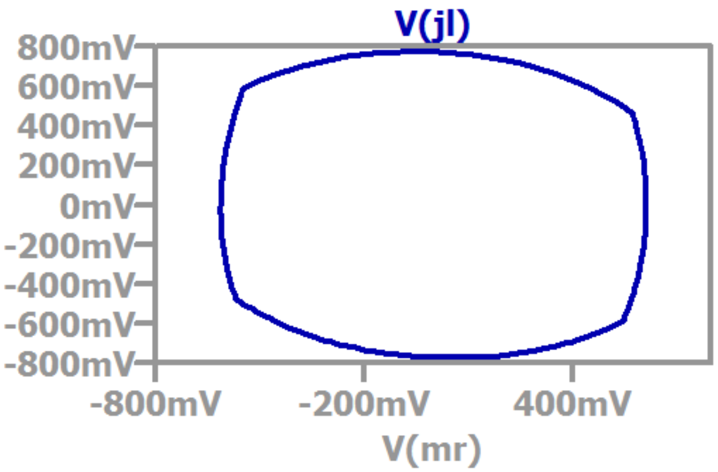


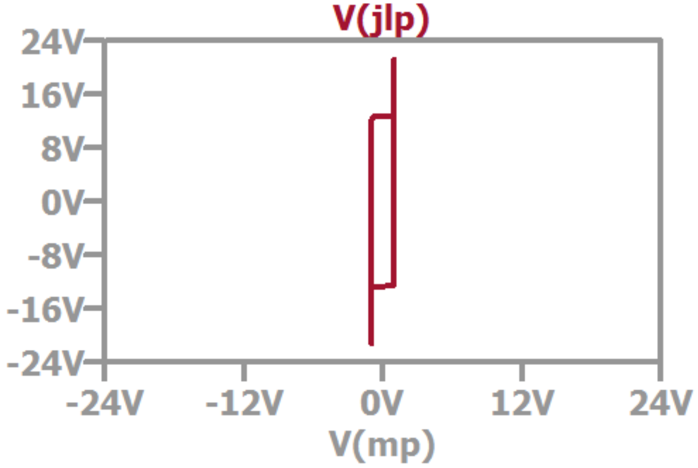


SRC Simulation

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

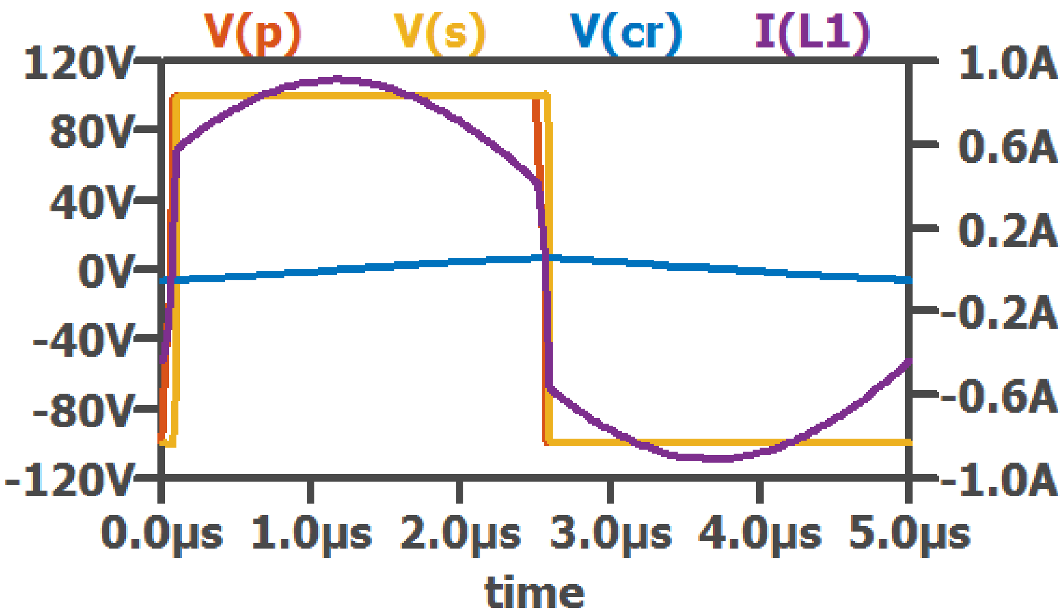


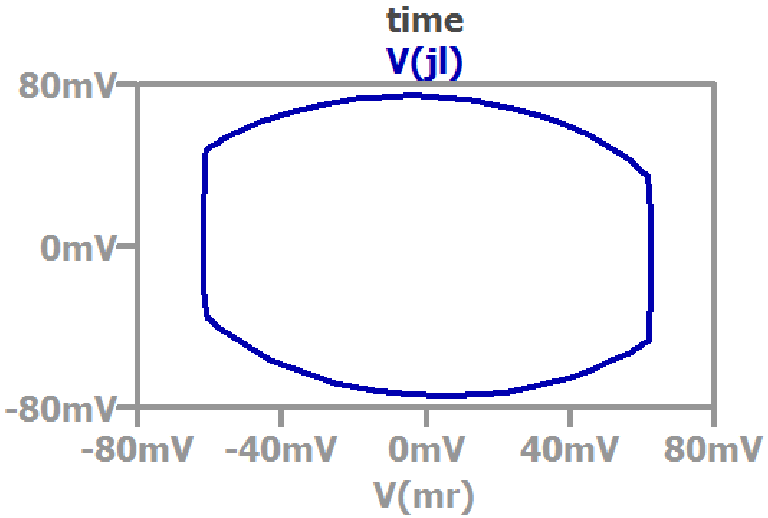


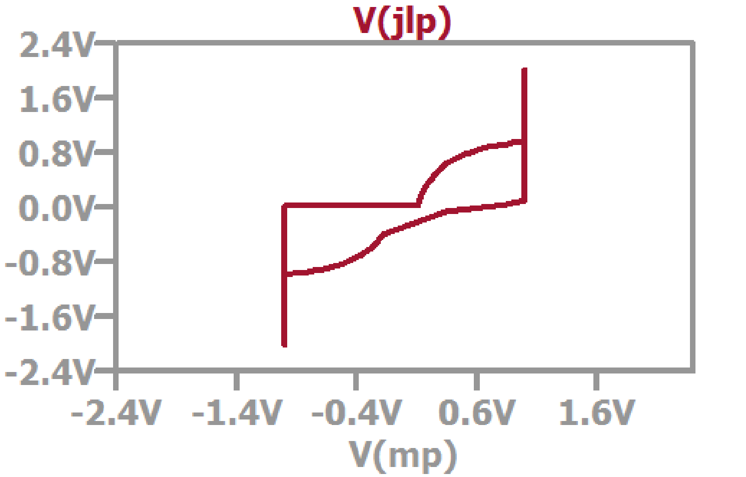


SRC Simulation

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

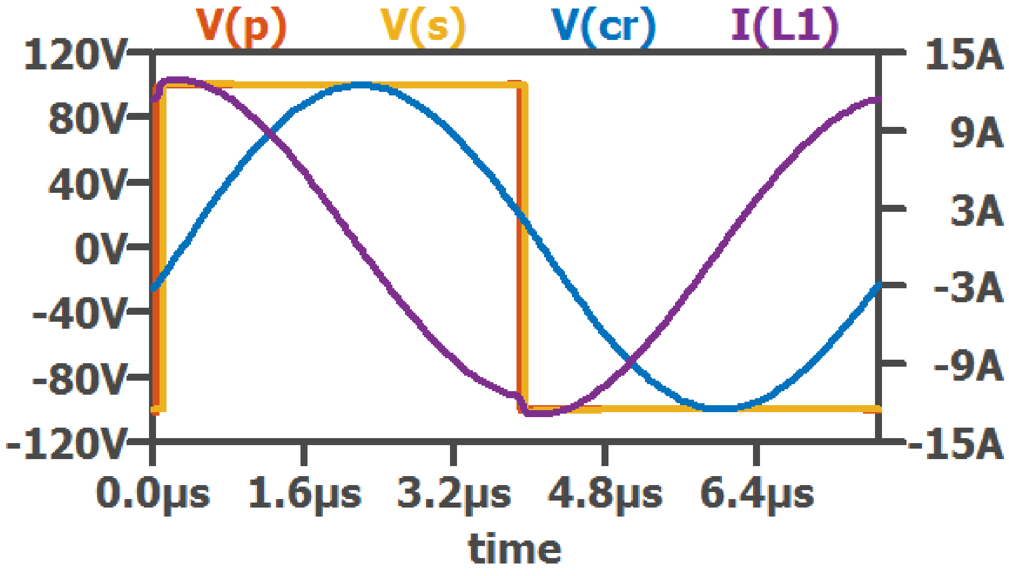


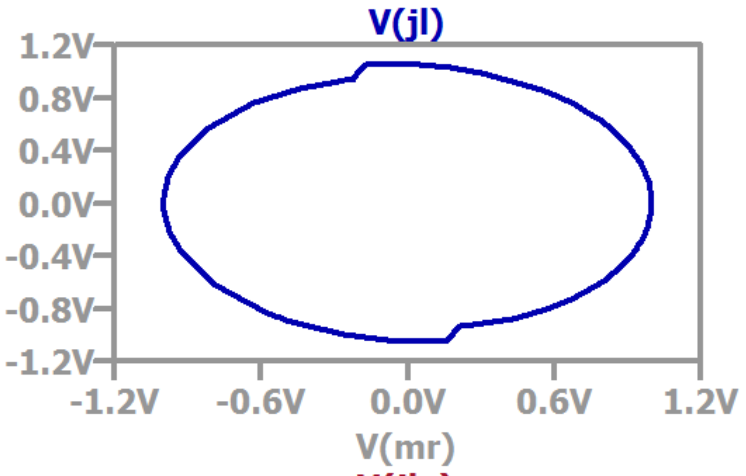


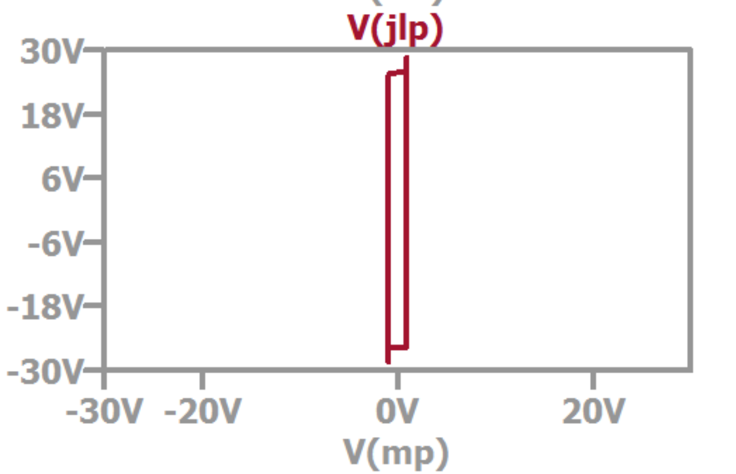


SRC Simulation

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

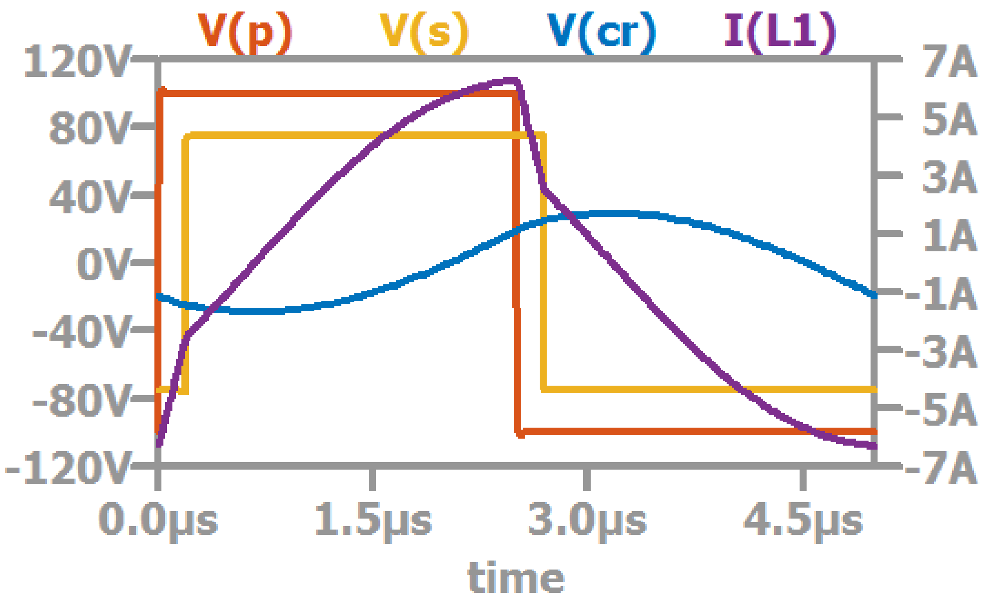


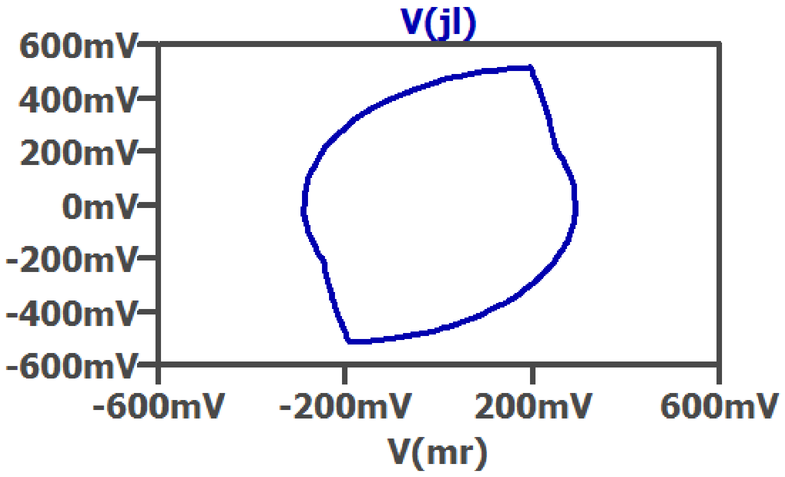


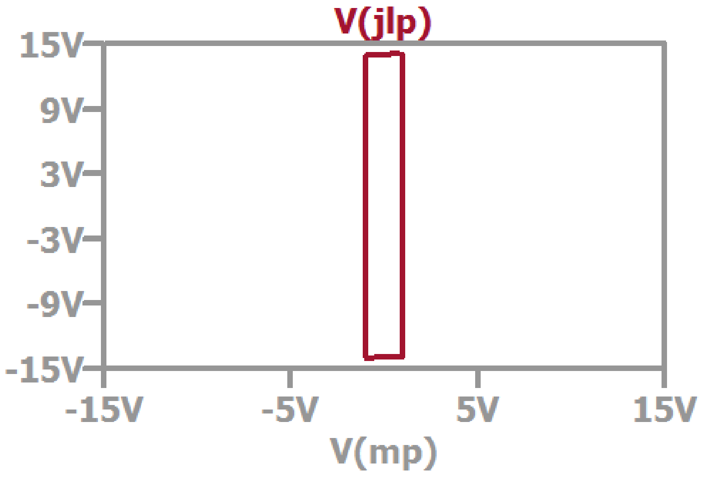


SRC Simulation

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







SRC Simulation

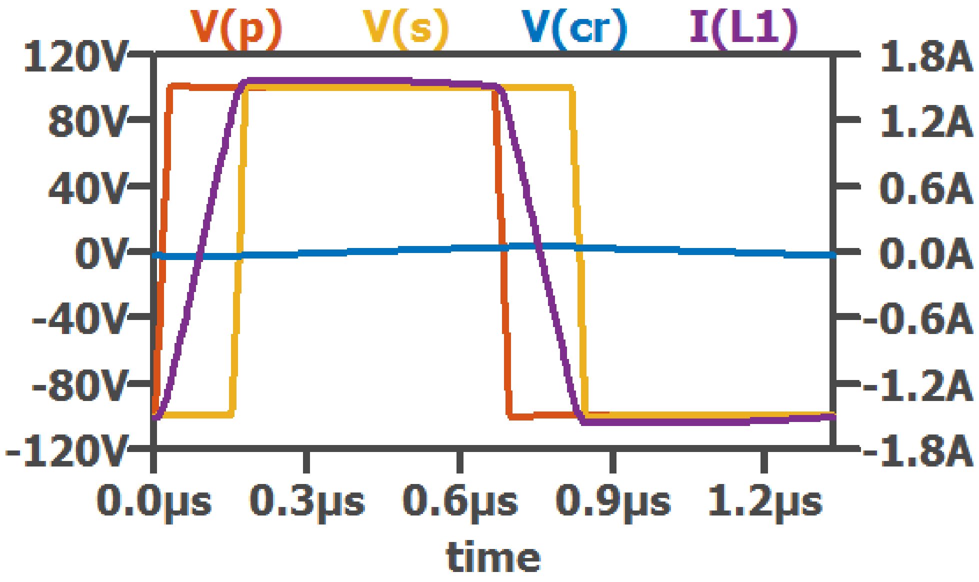
I_{out} = 1A

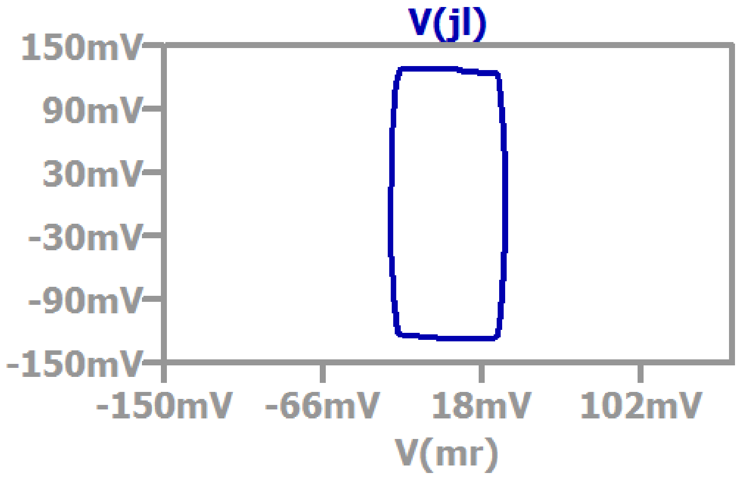
f_s = 750kHz

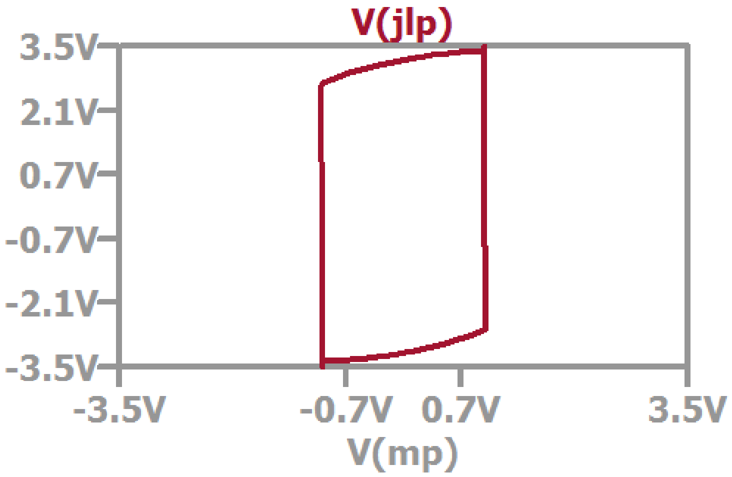
f_o = 130kHz

V_g = 100V

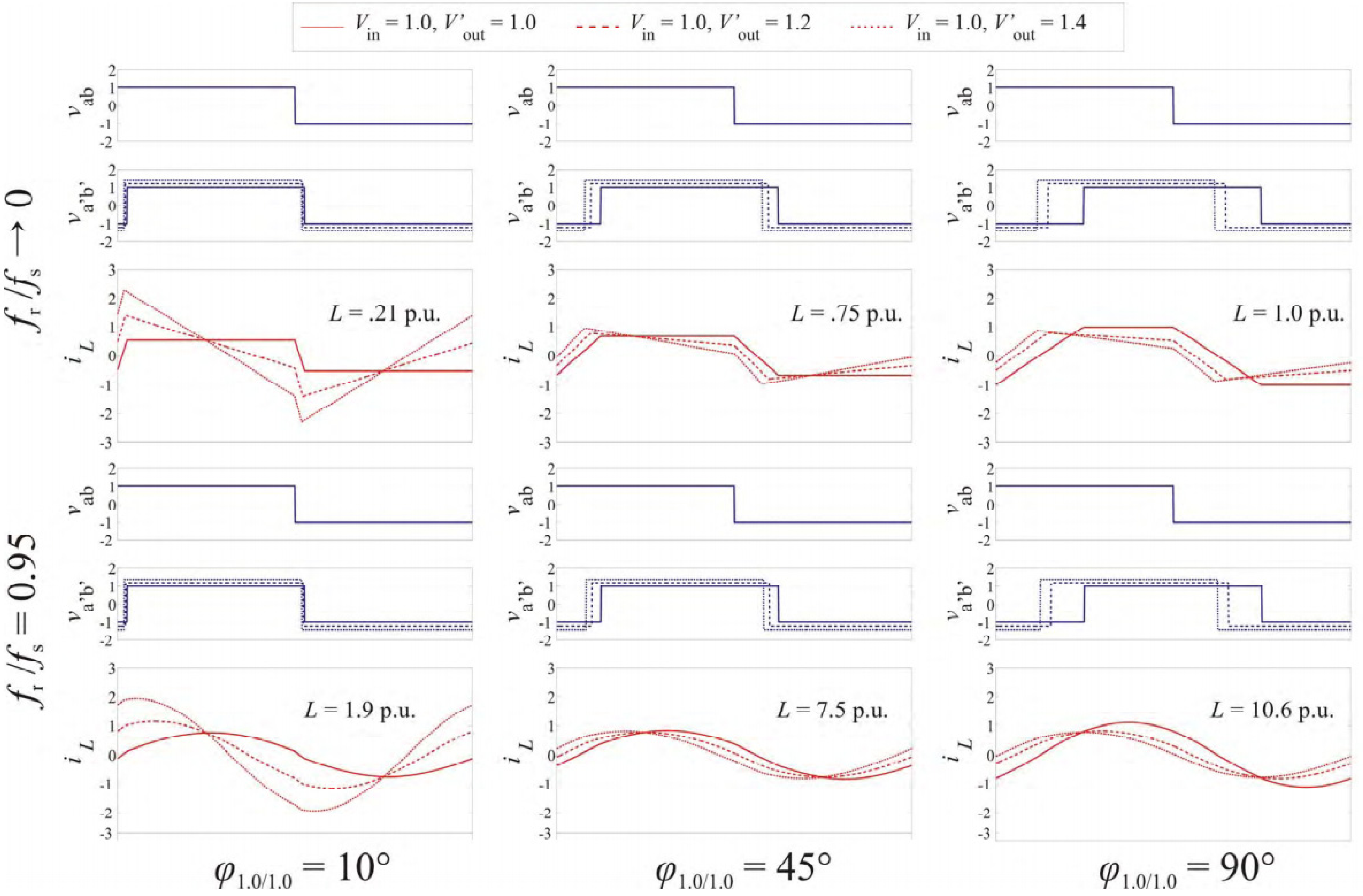
V_{out} = 100V



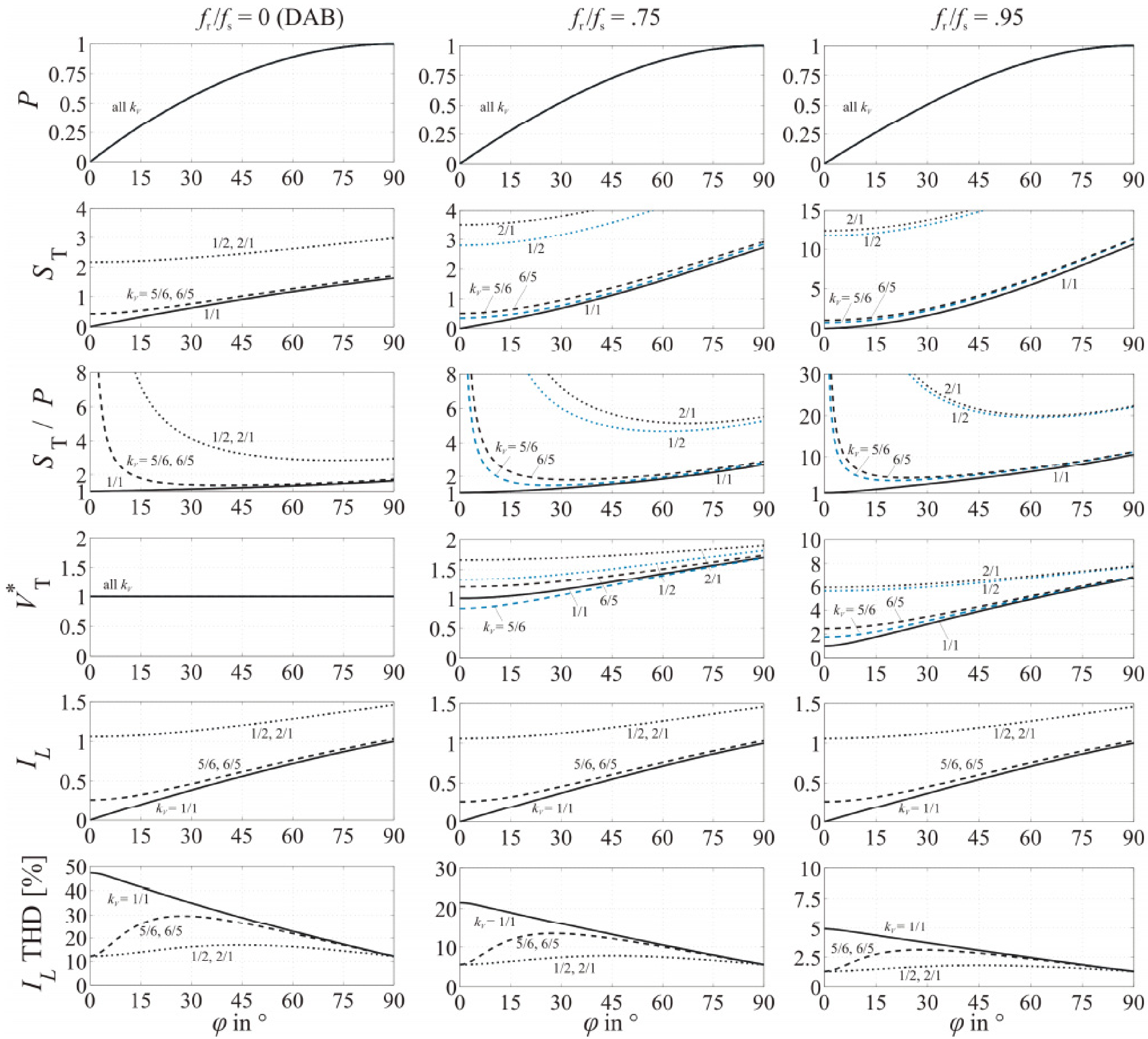




DAB vs SRC



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,"



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,"

DAB vs SRC: Conclusions

<u>DAB</u>

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

<u>SRC</u>

- \+ 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,"