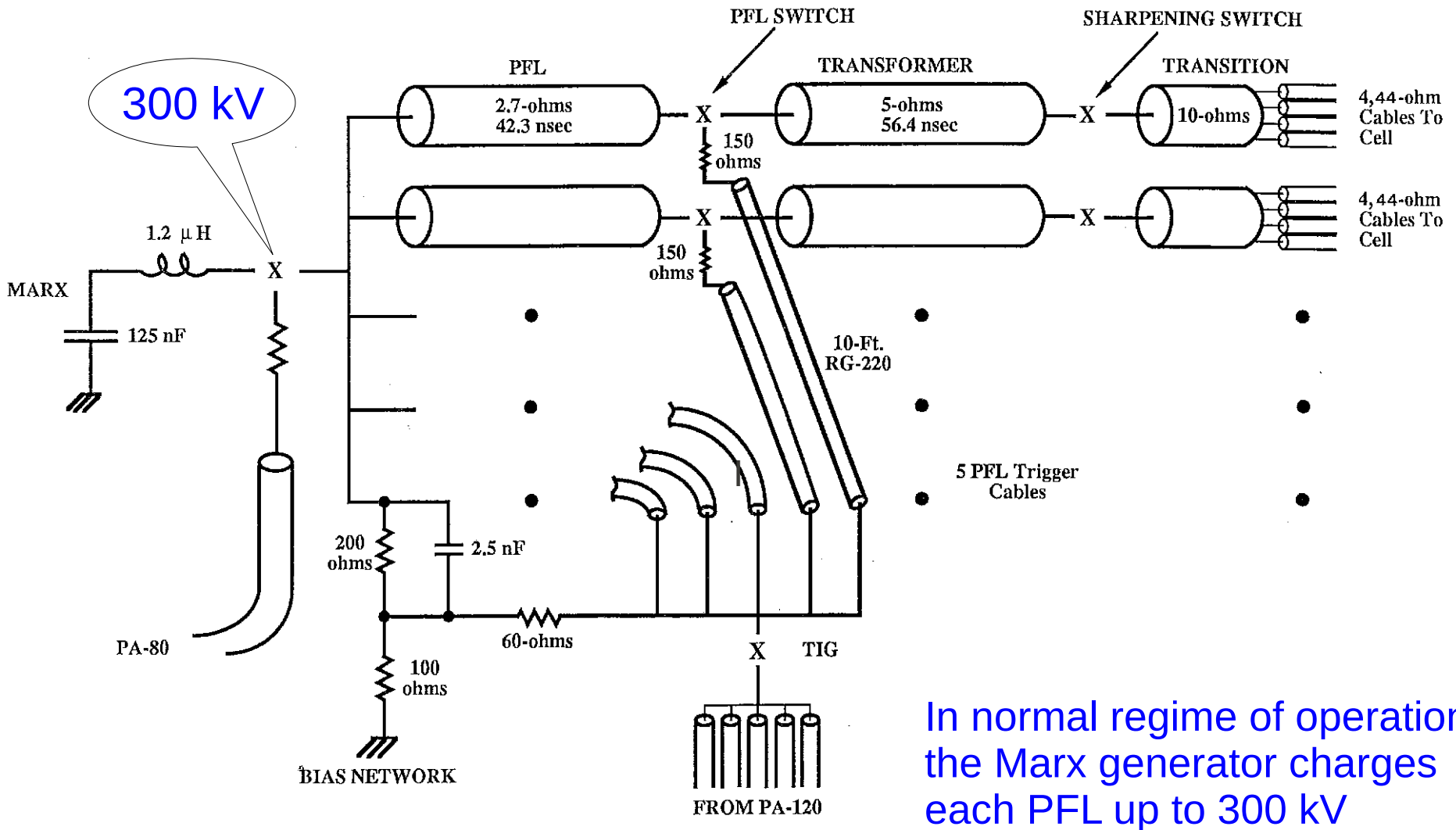


ISU ISIS:  
“What could be done  
with MARX?”

Roman Shapovalov  
IAC  
Feb 2, 2013

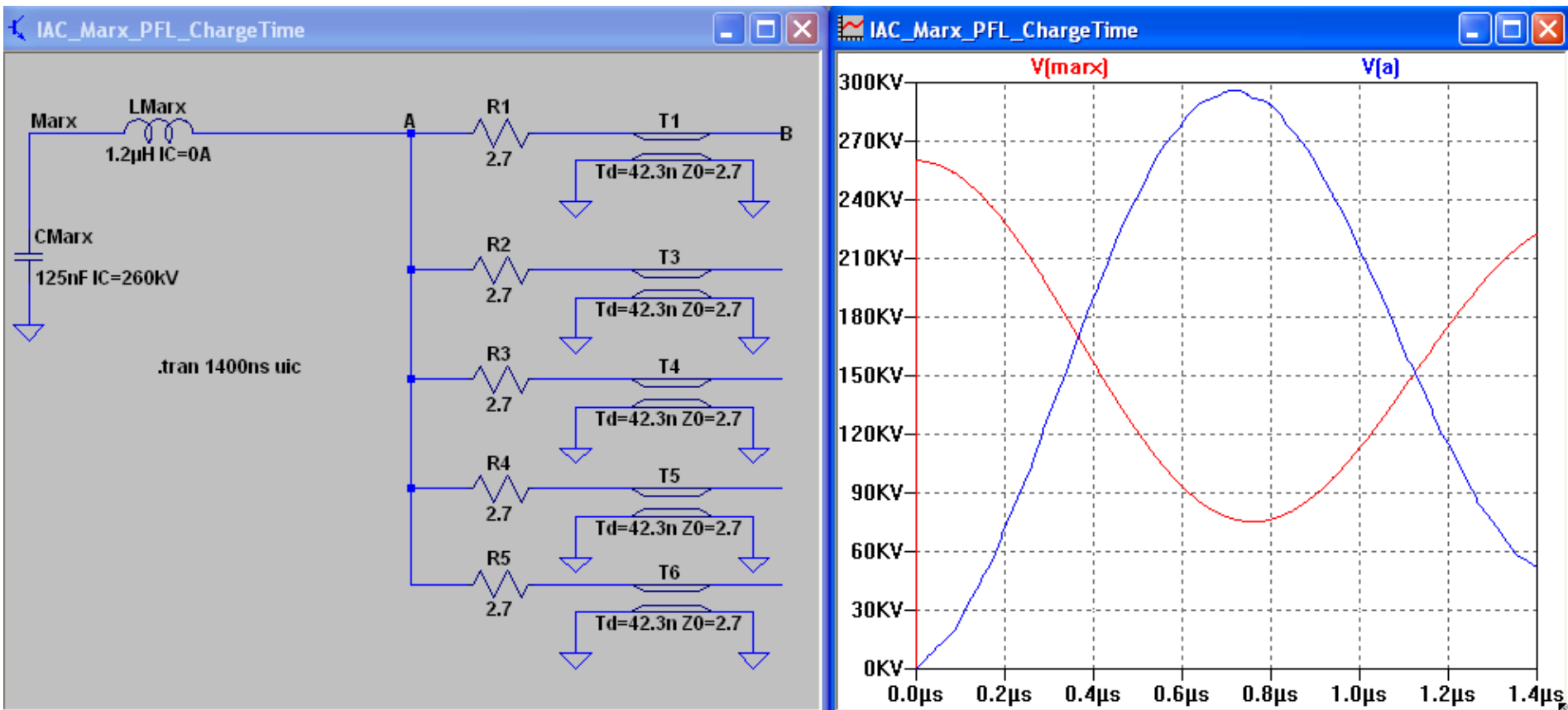
# MARX: Five Line Circuit with Marx generator



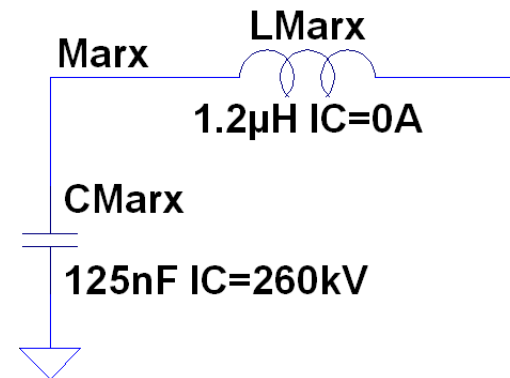
In normal regime of operation  
the Marx generator charges  
each PFL up to 300 kV

Figure 3. Five line circuit.

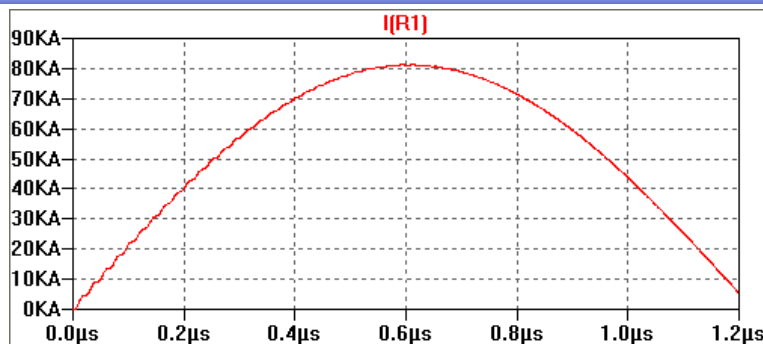
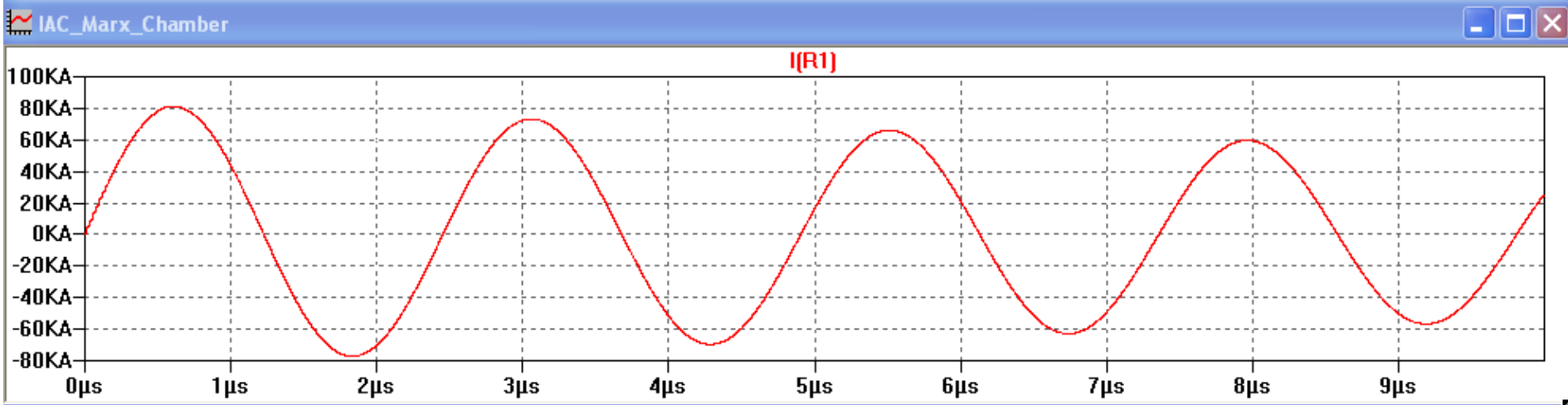
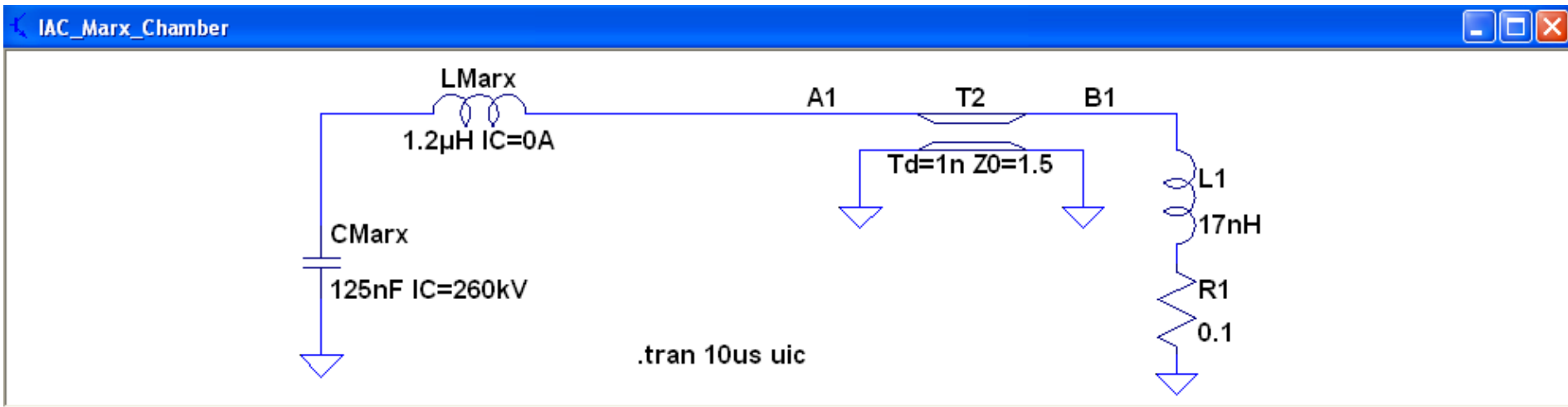
# MARX: Marx's Voltage



In order to charge each PFL up to 300 kV we need to charge the Marx generator up to 260 kV total

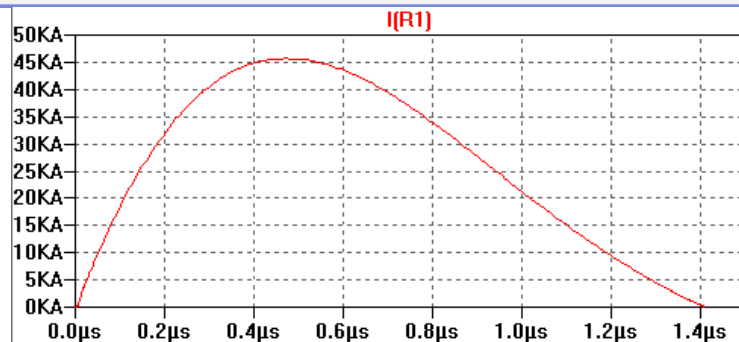
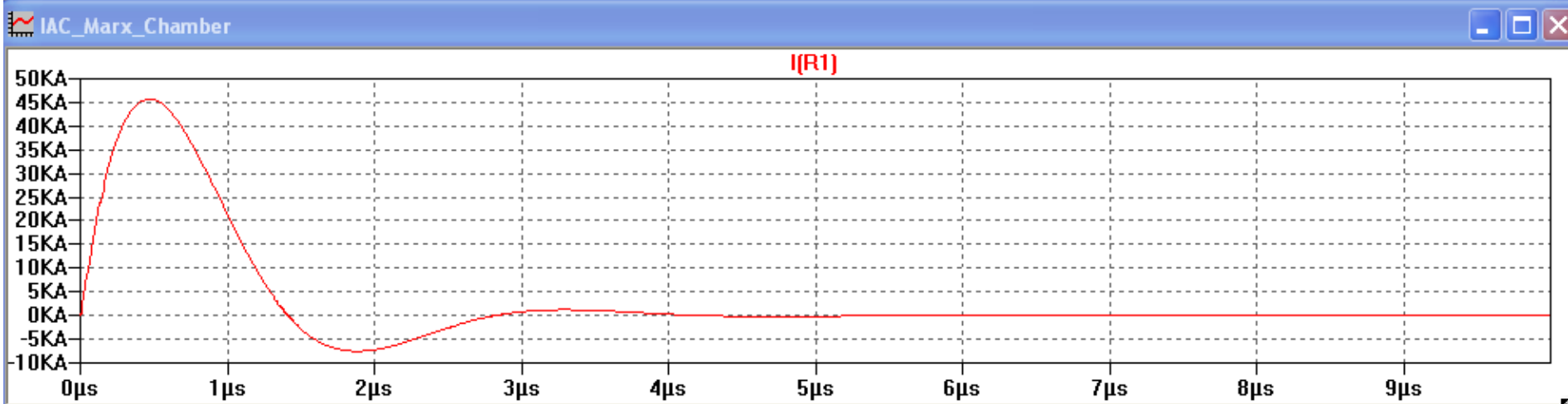
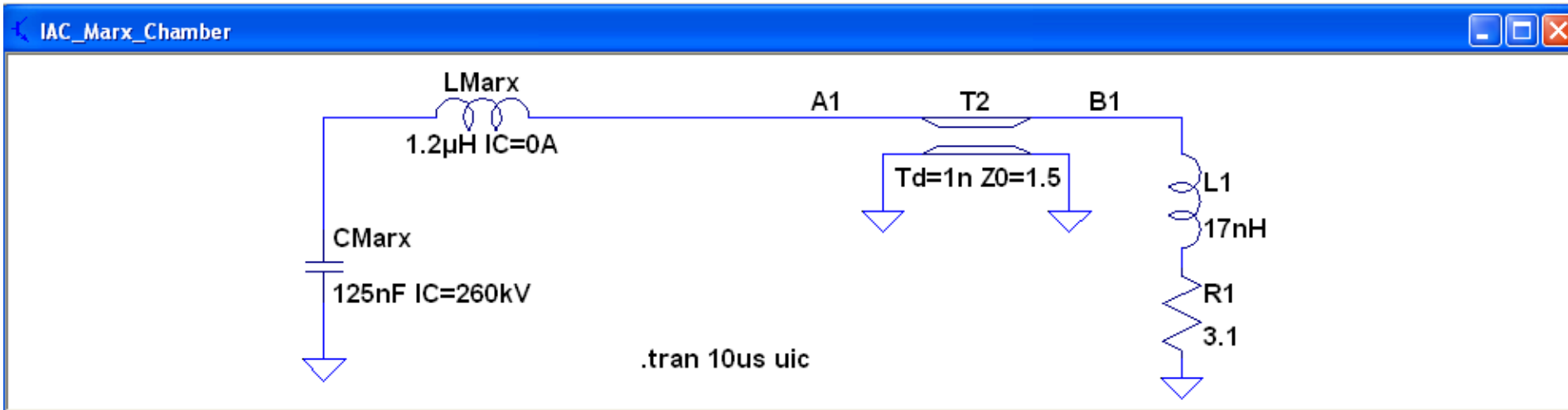


# MARX: Vacuum Chamber (VC) with 0.1 $\Omega$ load



$I = 80\text{ kA}$   
 $\text{FWHM} = 800\text{ns}$   
 $\text{Rise} \sim 0.1\text{ kA/ns}$

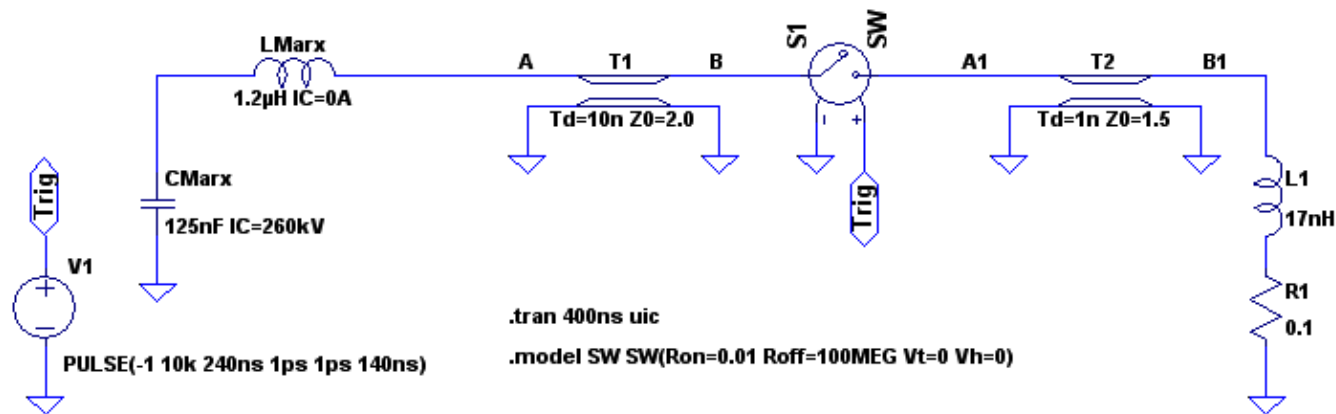
# MARX: Vacuum Chamber (VC) with matched 3.1 $\Omega$



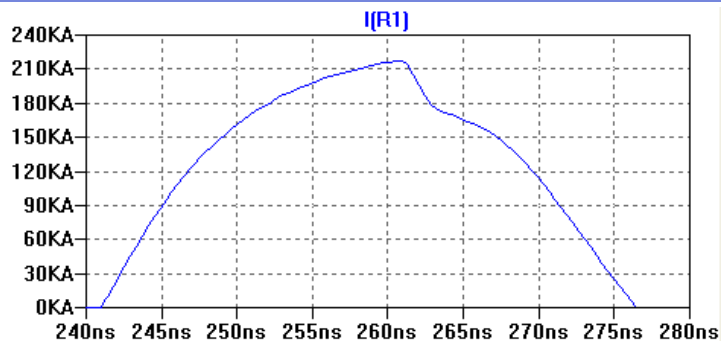
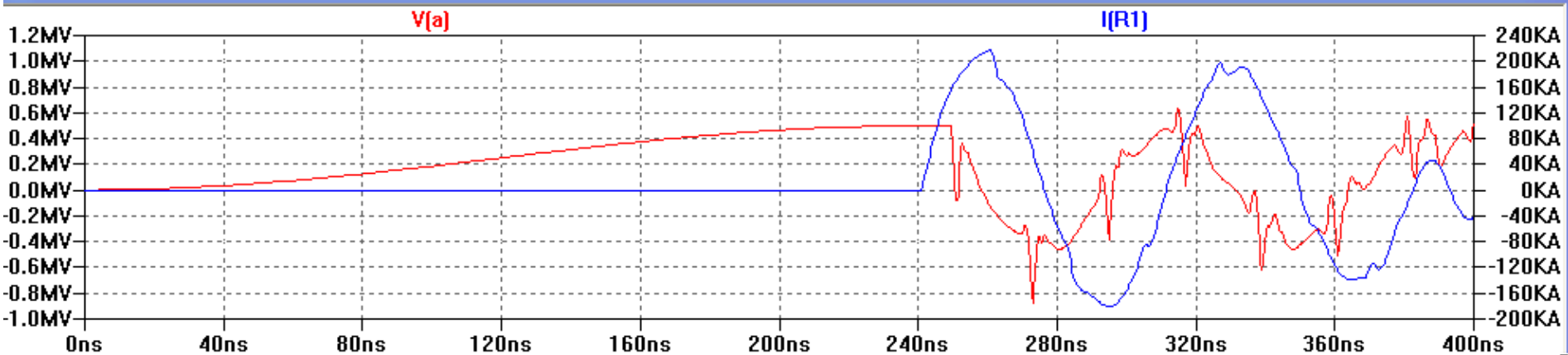
**I = 45 kA**  
**FWHM = 800ns**  
**Rise  $\sim$  0.15 kA/ns**

# MARX: One PFL + Switch + VC with $0.1 \Omega$ load

IAC\_Marx\_OnePFL\_Chamber



IAC\_Marx\_OnePFL\_Chamber



**$I = 210 \text{ kA}$**   
 **$\text{FWHM} = 25 \text{ ns}$**   
 **$\text{Rise} \sim 8 \text{ kA/ns}$**

## MARX: Summary

1. To do X-Pinch/Z-Pinch study with Marx generator would be good to have at least one Pulse Forming Line (PFL)
2. The length and impedance of PFL should be optimized for our need
3. With Marx Generator ( $C = 125 \text{ nF}$ ,  $C = 1.2 \text{ uH}$ ,  $V = 260 \text{ kV}$ ), one PFL ( $T = 10 \text{ ns}$ ,  $Z = 2 \text{ Ohm}$ ) and one Switch we can get up to 210 kA current with 8 kA/ns rise time