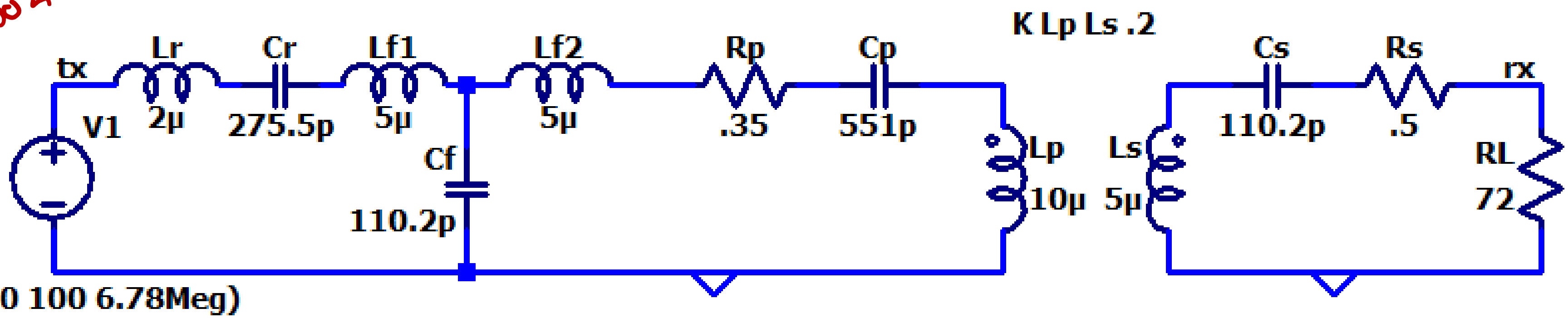
Circuit Solution Tips

- Stay symbolic as long as possible
  - Define new equivalent variables as necessary
- Order of analysis
  - Series/parallel equivalents
  - Source transformations
  - Transformer reflection
  - KVL/KCL equations (if you see a path forward)
    - Element Equations
  - Node Voltage / Mesh Current Analysis (otherwise)

Numerical Example

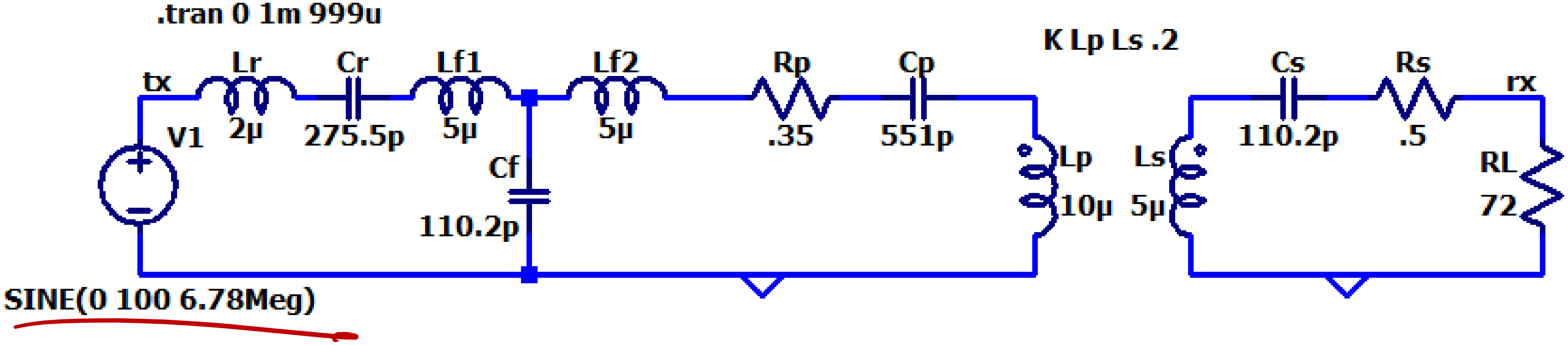


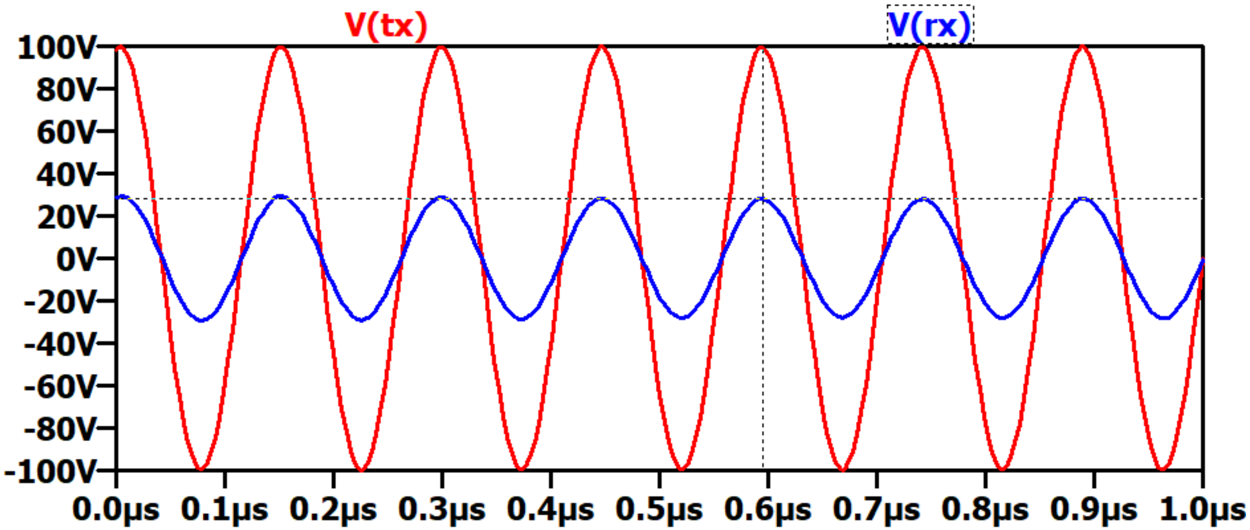
MATLAB Code:

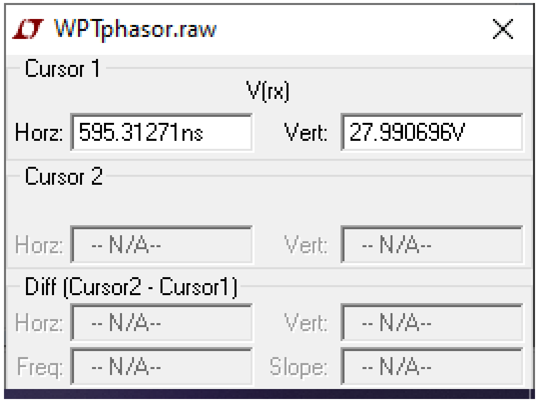
```
Z1 = 1j*(w*Lr + w*Lf1 - 1/w/Cr);
Z2 = -1j/w/Cf;
Z3 = Rp + 1j*(w*Lf2 - 1/w/Cp);
Z4 = 1j*w*Lp;
Z5 = 1j*w*Lk;
Z6 = Rs - 1j/w/Cs;

Va = N*VTX*(Z1*Z2/(Z1+Z2))/(Z1*(Z3+Z1*Z2/(Z1+Z2)))*1/(1/Z4 …
          + 1/(Z3 + Z1*Z2/(Z1+Z2)));
Za = N^2*1/(1/(Z3+Z1*Z2/(Z1+Z2)) + 1/Z4);
Zb = Z5*N^2;

VRX = Va*RL/(Za+Zb+Z6+RL);

mag = abs(VRX)
phase = angle(VRX)/pi*180
```

```
mag =
  28.0892

phase =
  -90.0000
```

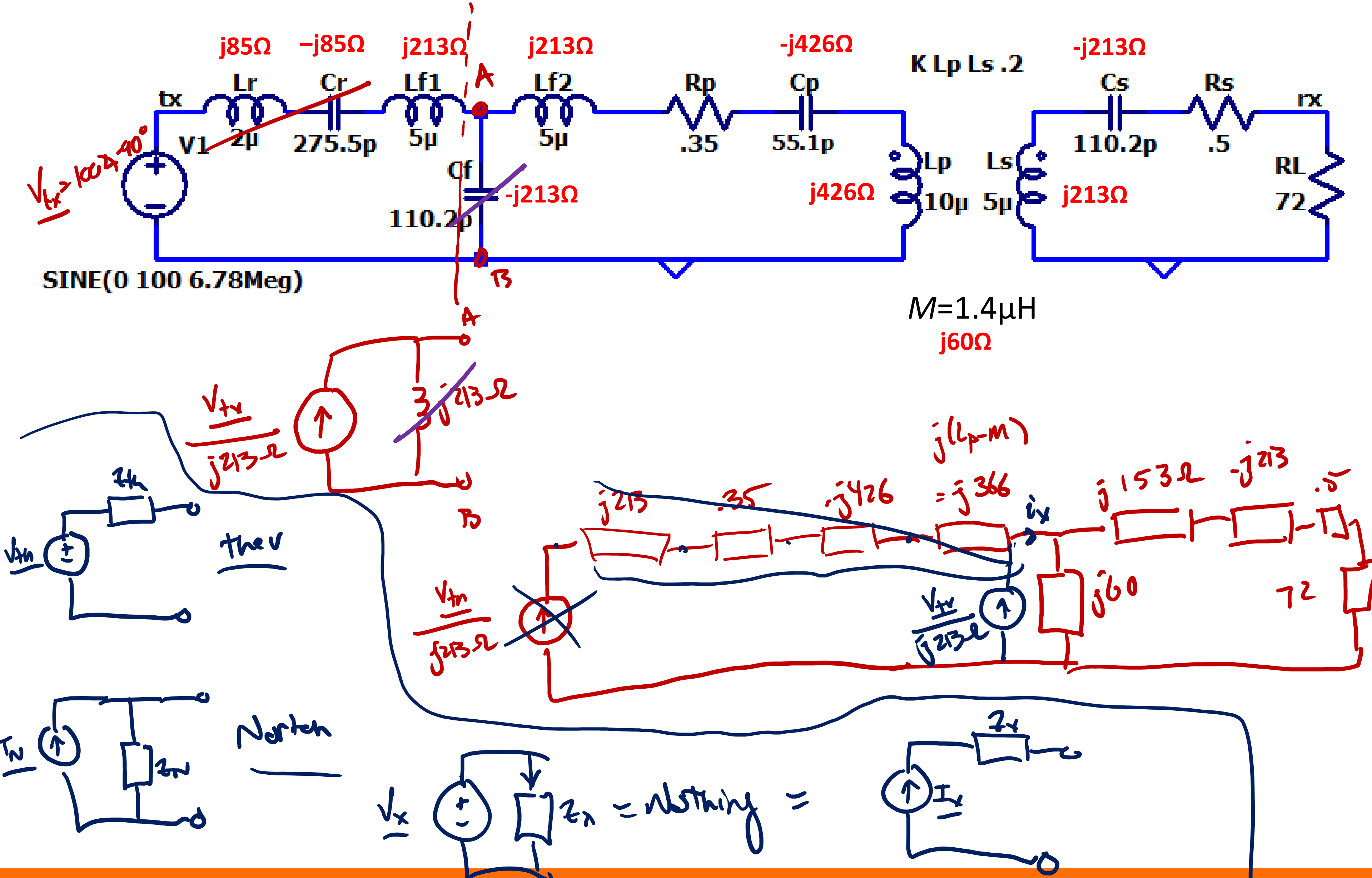
Circuit Simulation

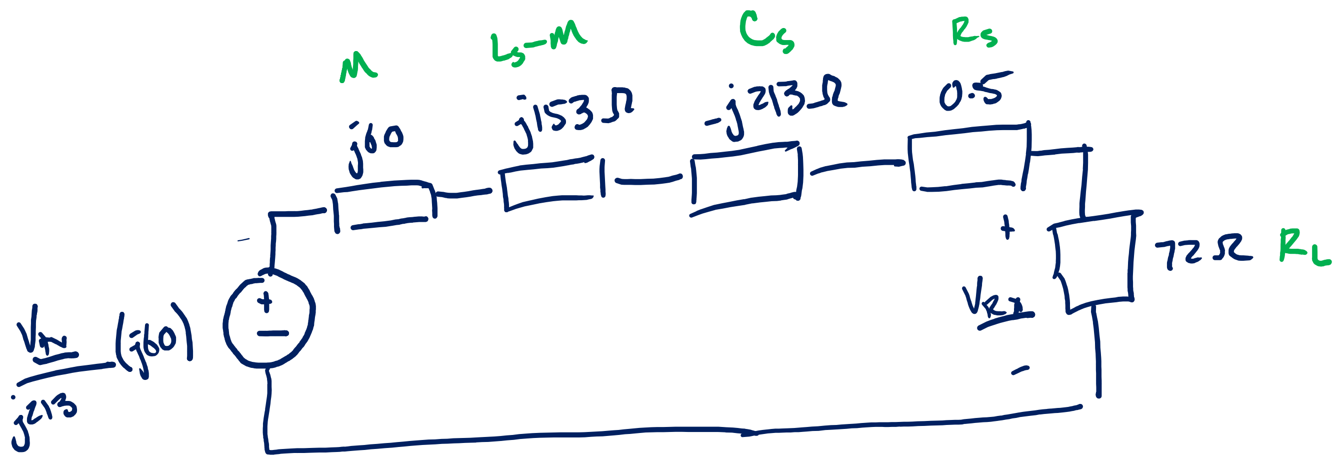






Resonance


j85Ω
−j85Ω
j213Ω
j213Ω
-j426Ω
K Lp Ls .2
-j213Ω
tx
Lr
Cr
Lf1
Lf2
Rp
Cp
Cs
Rs
rx
V1
2µ
275.5p
5µ
5µ
.35
55.1p
110.2p
.5
Cf
-j213Ω
110.2p
j426Ω
Lp
10µ
Ls
5µ
j213Ω
RL
72
SINE(0 100 6.78Meg)
M=1.4µH
j60Ω
Thev
Norton



$V_{RV} =$