ECE 2260 hw07

1. RLC Impedance

A 200 Ω resistor is in series with a 62.5 µF capacitor. This series combination is in parallel with a 400 mH inductor.

a) Express the equivalent s-domain impedance of these parallel branches as a rational function.

b) Determine the numerical values of the poles and zeros.

2. Poles and Zeros of Impedance

Find the poles and zeros of the impedance seen looking into the terminals a,b of the circuit shown in Fig. 1.

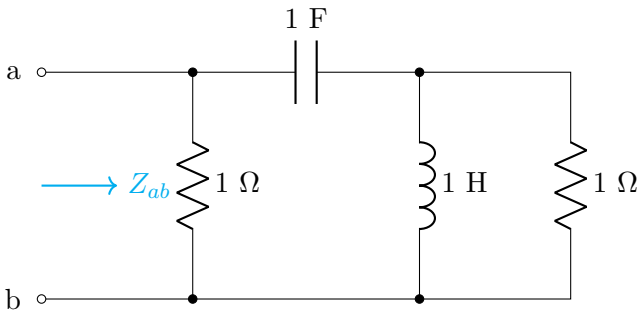

Figure 1: Circuit for problem.

3. Step Response of RLC Circuit

Find V_o and v_o in the circuit shown in Fig. 2 if the initial energy is zero and the switch is closed at $t = 0$.

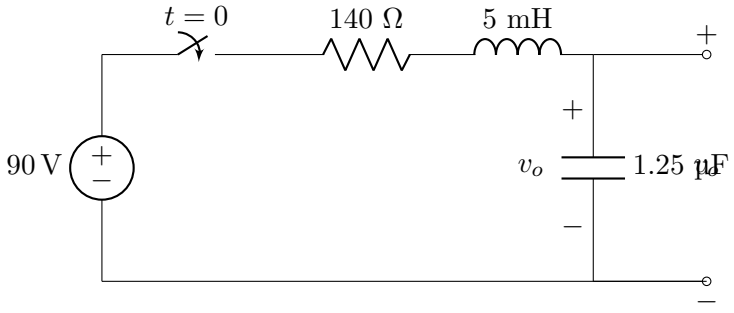

Figure 2: Circuit for Problem P13.9.

4. Switching RLC Circuit Response

The make-before-break switch in the circuit in Fig. 3 has been in position a for a long time. At $t = 0$, it moves instantaneously to position b. Find v_o for $t \geq 0$.

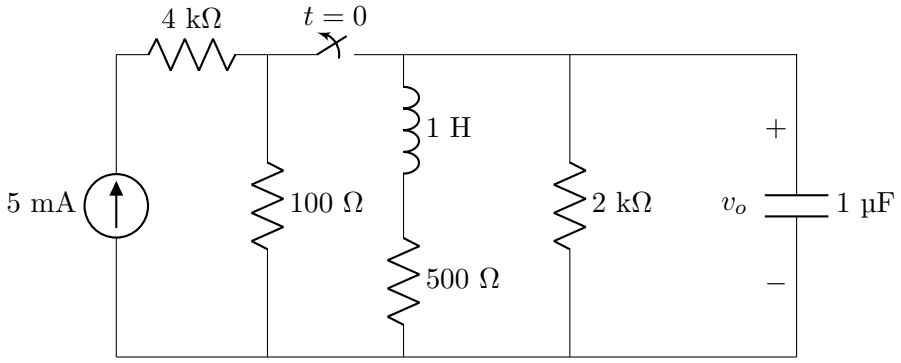

Figure 3: Circuit for problem.

5. Circuit Analysis with Laplace Transforms

There is no energy stored in the circuit in Fig. 4 at the time the voltage source is turned on, and $v_g = 325u(t)$ V.

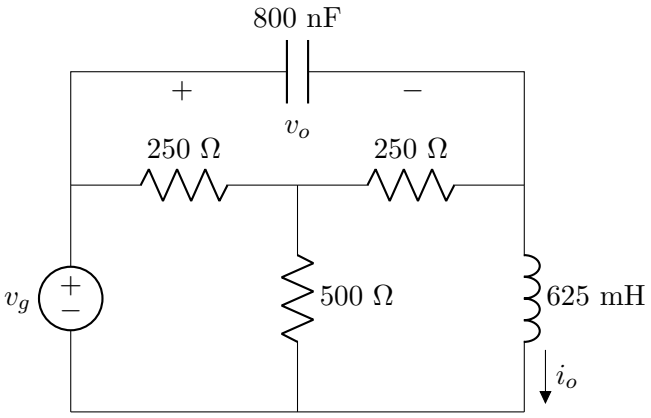

Figure 4: Circuit for problem.

a) Find V_o and I_o.

b) Find v_o and i_o.

c) Do the solutions for v_o and i_o make sense in terms of known circuit behavior? Explain.

6. Laplace Transform Circuit Analysis

Find v_o in the circuit shown in Fig. 5 if $i_g = 20u(t)$ mA. There is no energy stored in the circuit at $t = 0$.

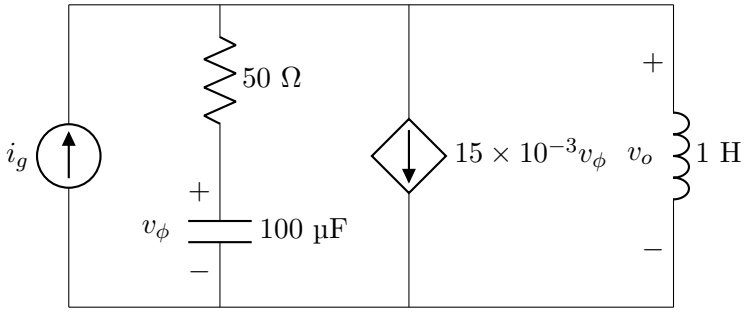

Figure 5: Circuit for problem.