

MAE 143 A: Signals and Systems.

Homework #2.

Assigned Apr 7. Due Apr 14.

- Write the equations governing the circuit in Figure 1 using the KCL, the KVL, and the elements' laws. The known constants are R_1 , R_2 , C . The known input signal is the current $i_S(t)$. Write the equations in terms of the outputs V_C and i_L .

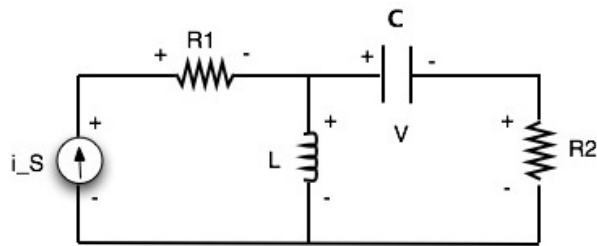


Figure 1: Figure corresponding to Problem 1

- Write the equations governing the multibody system in Figure 2 using Newton's laws.

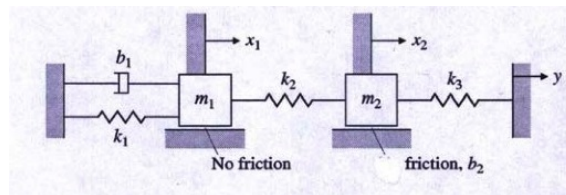


Figure 2: Figure corresponding to Problem 2.

- A circuit is represented by the diagram in Figure 3. Using the KCL, the KVL and the elements' laws, find an ODE model for the system. The known constants are R , L and C . The input to the system is the current i_S , and the outputs are i_L and V_C . What is the state of the system? Write the system in state space form using matrices and vectors.

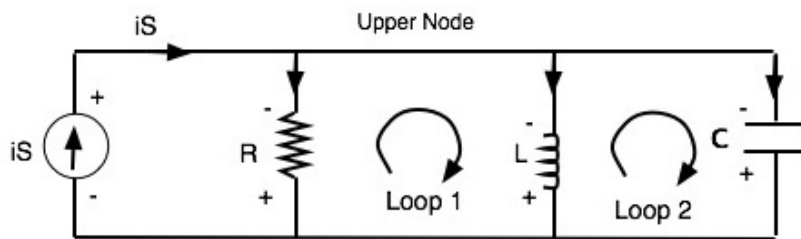


Figure 3: Figure corresponding to Problem 3.