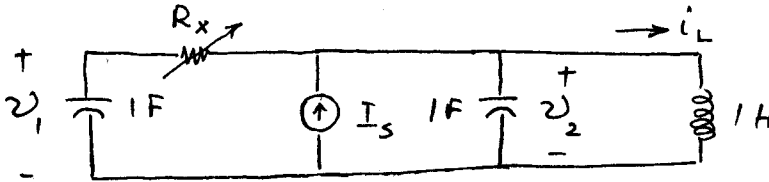


Project #1: COMPUTER AIDED CIRCUIT ANALYSIS & DESIGN

1. Consider the following RLC circuit.



For this circuit,

- Write the state matrix equation in the form $\dot{x} = Ax + Bu$. The state vector is $[i_L \ v_1 \ v_2]^T$. u is the current source I_s . Consider the value of the variable resistor $R_x = 1\Omega$.
- Learn MATLAB commands for solving the above state equations. Use the built-in functions for solutions of these equations. Consider all the initial conditions to be zero and a unit step input for the current source. Consider the total time of solution to be 25 seconds.

[Alternatively, develop a computer program to solve these equations using Euler's method as taught to you in the class. The codes can be in FORTRAN, MATLAB or C++. Use a time step $\Delta t = 0.1\text{sec}$ for FORTRAN and C programs].

- Plot all the state variables.
- Re-design the above network so that one of the eigenvalues of matrix A is less than -3 . Considering resistance R_x to be a variable, find the range of its value to satisfy this condition.

[Hint for part d: Eigenvalues of a matrix are like the roots of a characteristic equation which you studied in Ch.8. Use MATLAB command `eig(A)` to find the eigenvalues. Try various values of R_x , so that your desired condition is satisfied]

Due: 26 July 2004