ECE 521 Fall 2016

Homework #2 - Part 2 (Due Oct. 26)

Note: This is a programming assignment.

In this exercise you are to interface the sparse-matrix solver Sparse1.4 to your existing code of *myspice* and also setup a Newton iterative loop. This will allow you to do dc solution of linear circuits. **Note:** The following files have been modified from HW#1: main.c, res.h, res.c, utils.c, and Makefile.

a) Once you extract the files from the shar file (sh FILE), a stripped down version of Sparse1.4 (http://sparse.sourceforge.net/) will be available in the directory *sparse*. You can compile Sparse by typing make in the *sparse* directory. This command will create an executable *sparse* and a library *sparse.a*. The executable can be tested on example matrices mat[0-3] whereas the library can be linked with *myspice*. Go through the documentation of Sparse1.4 (file spDoc.pdf).

b) For each element (V, I, G, E, F, H, N, T, and O) define a Setup function *setup<Element>*, that creates the sparse matrix entries. You should add direct matrix pointers to your element data structure as shown in the resistor example (res.h, res.c). This function will be called only once.

c) For each element (V, I, G, E, F, H, N, T, and O) define a Load function *load<Element>*, that stamps the numeric values of the components in the sparse matrix. This function will be called repeatedly, e.g., within a Newton loop. Once again an example for the resistor is provided. For the test cases test[1-8].ckt determine the number of fill-ins with Sparse1.4.

d) For the test cases test[1-8].ckt print the dc solution. Suggest one way of verifying that the solution is correct.

e) Use your test circuits from HW#1 for the two port networks (N, T, and O) and print their dc solution

f) Implement the Newton loop in *myspice* and test it on the circuits test[1-8].ckt. Since these are linear circuits the Newton method should converge in 2 iterations!