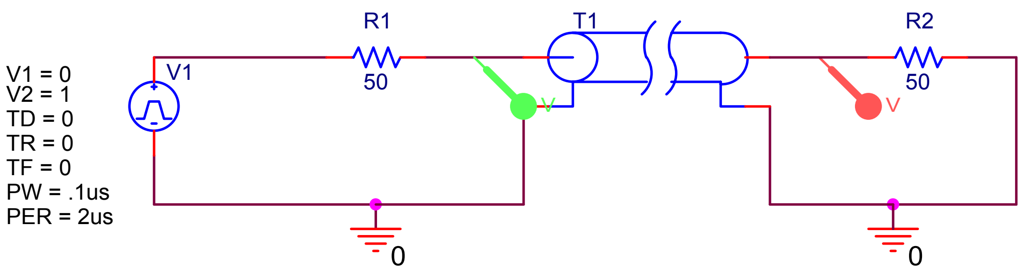
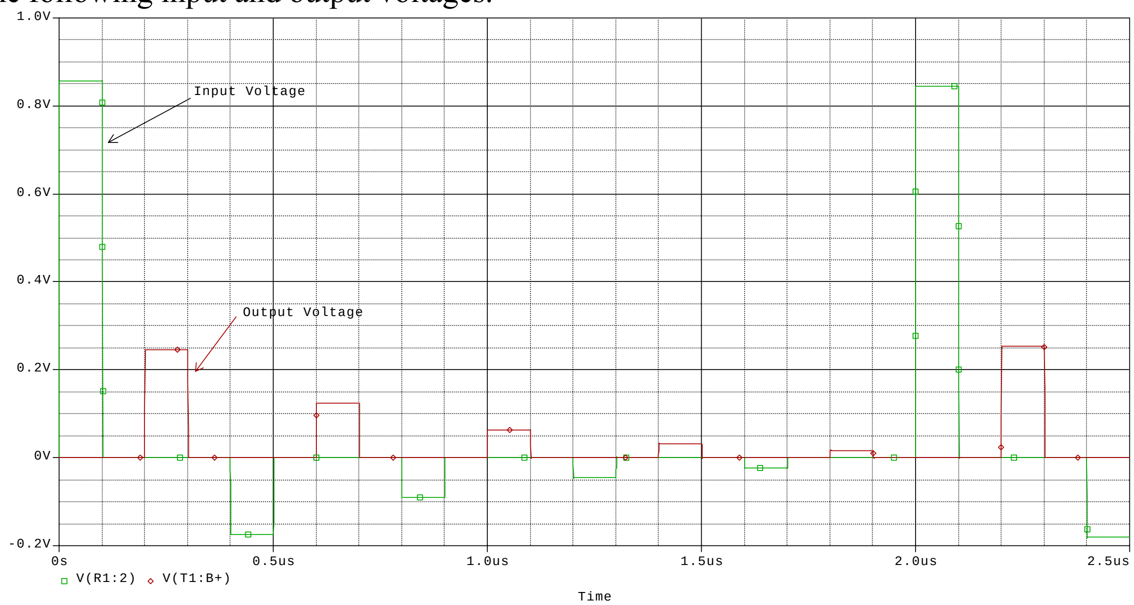
3. Input and output voltages for pulses on transmission lines.

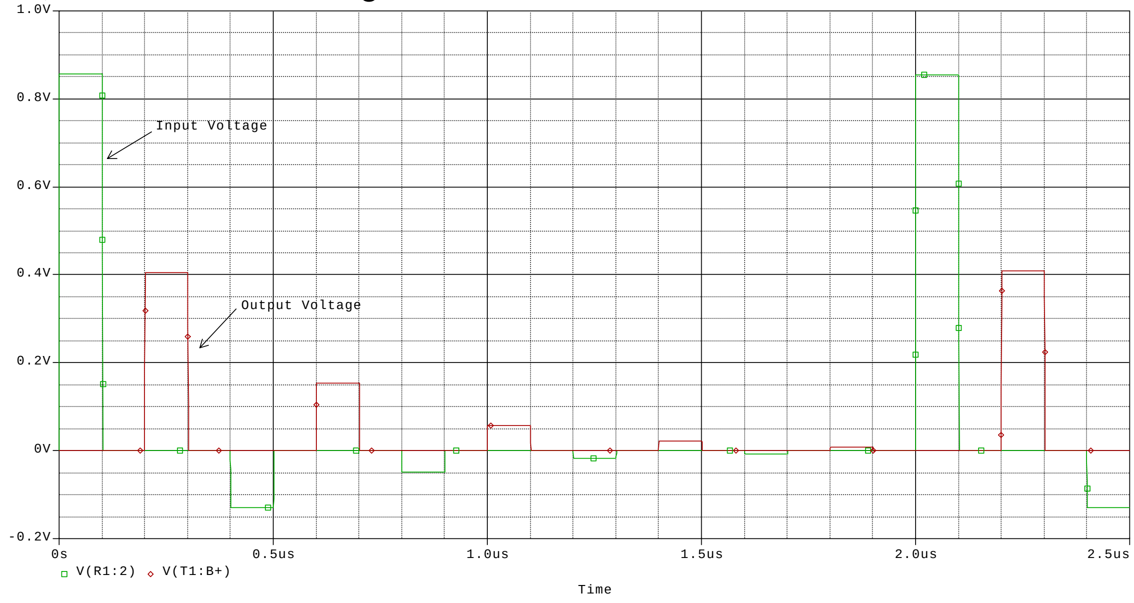
A simple transmission line setup, like the one we use in class, can be simulated using PSpice. For the case considered here, we do not know anything about the transmission line, except that it is lossless and that its velocity of propagation is half the speed of light. (The line is partially hidden, so we cannot measure its length, but we can tell what the insulator is, so we know the velocity.) That is, we do not know its characteristic impedance or its length. To figure out these properties, we do a series of experiments.



First, we assume that we have a 50 ohm line and set it up as shown above. We set the function generator to produce 0.1 microsecond pulses every 2 microseconds and obtain the following input and output voltages.



Next, the load resistor is changed to 93 ohms.



a. Use the information in the plots to determine Z_o and the length of the transmission line.

b. Leaving the function generator as is, change the load so that it is matched to the line, then find the input and output voltages and plot them below. Note that the ground voltage has been plotted as a reference line.