Wave Propagation along Transmission Lines
Problem Set 3

1. Consider the network consisting of two transmission lines shown in Fig. 1.

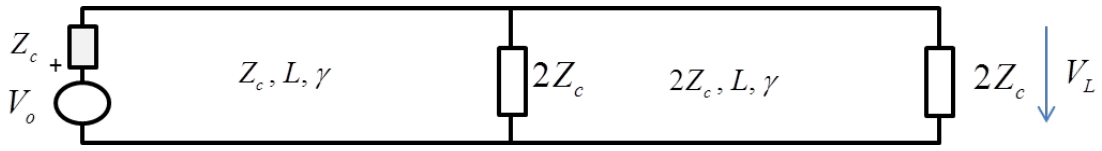

Fig. 1

Using the network reduction technique, compute the expression of the load voltage V_L.

2. In your first job as an EMC engineer, you are asked to design a matched termination Z_L for a power cable located over a highly conducting earth, as shown in the figure below. Using the dimensions of this line as provided by our boss, determine the required impedance for a matched load.

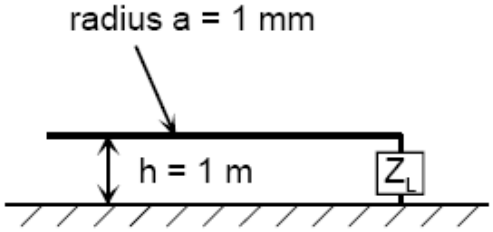

Fig. 2

3. You provide the answer to problem #2 to your boss, and he says that he forgot to tell you that the power cable actually has 3 conductors: two phase conductors and one neutral (green) conductor. He really wanted the terminating impedance network that will match the multiconductor line. He then provides the more detailed information below.

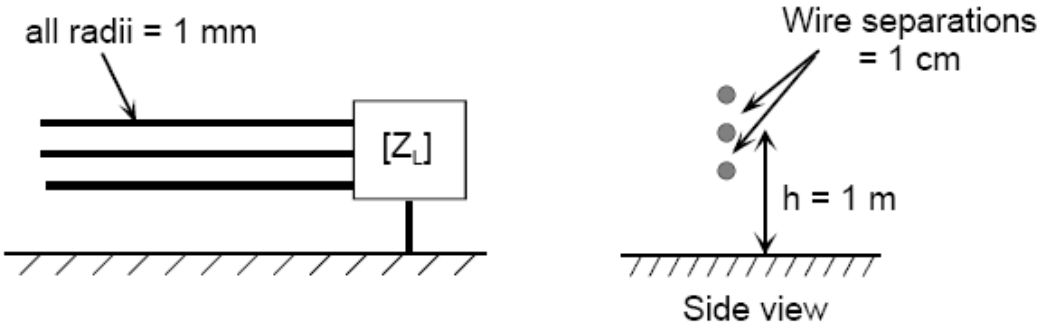

Fig. 3

For this line, compute the desired termination impedance matrix that will provide a matched load, and illustrate by a circuit diagram how the various impedance elements should be connected to the wires and the reference conductor.