This paper explains the logic script defining the original 1/2λ TLT

The original was written in 1968 by K9AXN

DRAFT not complete yet

Configuration:

Media: Electrical 1/2wl ladder line with 600 Ohm surge impedance. 50 Ohm load attached to the end and 70.7v with 1.4142a available at the other. The Q of the transformer is 600r ÷ 50r =12.

The source represents energy, it has 70.7v of force and available current of 1.4142a.

Step 1: 70.7v is applied to a 600r line with 70.7v @.11783a entering the line. This represents 8.3308 Watts of power in the traveling wave.

Step 2: The power in transit is independent and has no affiliation with source or destination. A wave of 70.7v @ .11783 will reach the 50r load and the following steps will be defined sequentially.

Step 3: .11783a will enter the 50r load dissipating (.11783a • 50r = 5.8915v) of the original 70.7v @ .11783a, leaving 64.8085v @ .108014a. (70.7v – 5.8915v = 64.8085v) and (64.8085v ÷ 600r = .108014a).

The logic of this step will be fully explained in a follow-on paper.

Step4:At this point, 5.8915v • .11783a has entered the 50r load with no reflections and the remaining 64.8085v @ .10801a of the available power will be divided between forward and reflected power.

STEP5: Now, to determine how the remaining power 64.8085v @ .108014a will be divided between forward and reflected power. When the Z0 of the line is > than the load, the series resistance of the line and load will be used for calculations, and when the Z0 of the line is < than the load Z0, we will use parallel resistance. For this configuration, the Z0 of the line is > than the load, so we use series resistance 50r + 600r =650r.

This step will be fully explained in a follow-on paper.

Step6: Calculate the total forward power. The remaining (64.8085v/650r = (.09971a) is applied to 50r impedance (+.09971a • 50r = +4.9855v) forward. To complete the forward calculation, add (+4.9855 @ +.09971a) and (+ 5.8915v @ +.11783a) from step 3 = 10.877v @ .21754a. Forward, this is the total forward power **2.3662w**.

Step7: Calculate the reflected power. (-.09971a X 600 = -59.826v) -59.826v @ -.09971a is Reflected power **5.96w**

**5.96w + 2.3662w = 8.33w** the input power of cycle 1 is 8.33w. CHECK

Step8: At this point, -59.826v @ -.09971a is on the way back to the source.

The source represents energy not power. When the reflected wave reaches the source, it will meet +70.7v @ available +1.4142a.

-59.826v@.09971a will flip, reentering the wire as +59.826v @ +.09971a where the source +70.7v @ .117833a will be added for a total +130.526v @+.21754a wave sent to the load.

Step9: The above process will continue until steady the state is reached.

Calculate the steady state voltage: Step 3 calculates the first of two parts of forward power. This step renders the power entering the load that causes no reflections. It is 5.8915v@.11783a. This will be added to the remaining forward component of the divided power, (4.9855v @ .09971a).

(5.8915v + 4.9855v = 10.877v), and (.11783a +.09971a = .21754a). Total 10.877v @.21754a forward power. Calculate steady state: (70.7v ÷ 10.877v = 6.5)

(70.7 • 6.5 = 459.55v). 459.55 ÷ 600 = .765916a. 459.55v @ .76592a is steady state.

This paper uses Charge and Current density.

Regards Jim K9AXN