Ham 121 - Antenna modeling eznec

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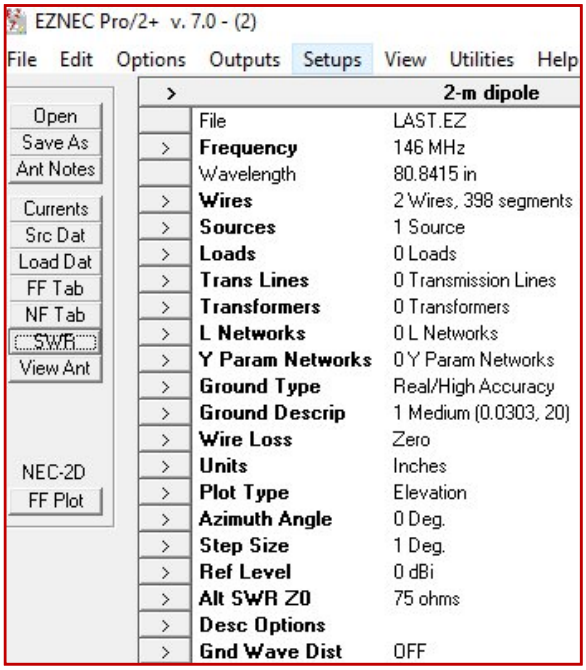
The first thing most hams build is an antenna. Is it as good as commercial? It certainly can be even better.

Where do you start? Eznec Pro2+ v7.0 is professional grade software, now free to the public. Roy Lewallen, W7EL, developed the interface for the Lawrence Livermore Numerical Electromagnetics Code (NEC).



Start the app to see the main screen. Open a file.
The last one used was saved in LAST.EZ. Save your own copy.

Click Open to see demo files. Cebik (SK) has many samples.
Set the antenna frequency. It returns wavelength.
Change the Units lower on the screen.

Click Wires for an entry box. An antenna is a grouping of wires.
Antenna segments start from End 1 coordinates X-Y-Z.
That wire finishes at End 2 coordinates X-Y-Z.
Give diameter in AWG, inches, or metric.

Use as many wires as necessary.
A dipole can be one wire, but I prefer two for ease of variations.
A ground wire is any wire that has one end at 0 elevation.

Let's build a model of a two-wire dipole.
For 2-m, 146 MHz, λ = 80.84", mount in attic 12' above earth.
Quarter wave = 20.21". Use as starting point.

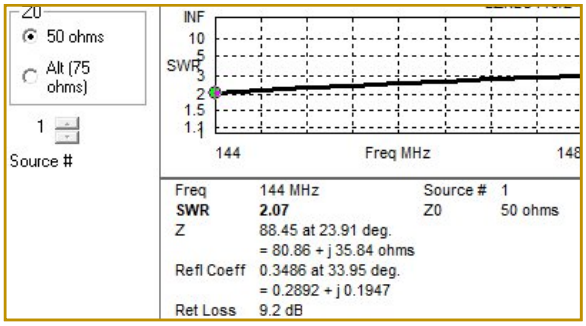
Click Wires to enter data.
Segments are a number to break-up each wire. Start with 10/inch. A dialog box informs if segment is too short or long.
The table will show which ends connect.

Click View Ant to see a sketch.

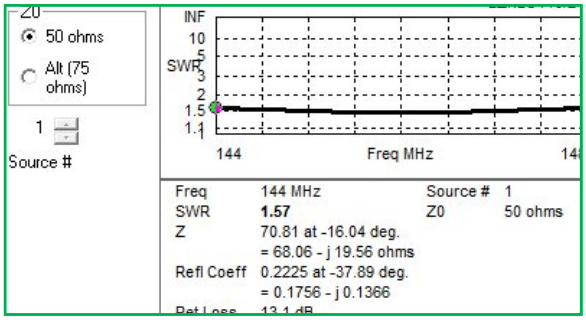
Click Sources to add a coax connection.
For most, I place source 1, on wire 1 at 0% from end 1.
By being consistent, you know where it is on every model.

Click Ground Type. Real is realistic. Free Space gives results without Ground-Effect from being lower than 2λ.

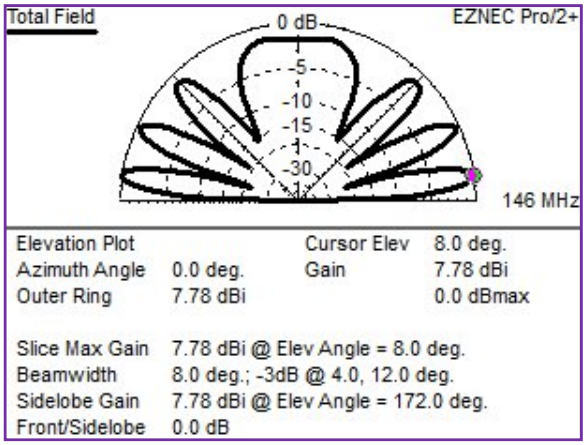
Click SWR. In Dialog set start and stop frequency bandwidth.
2-m is 144 to 148 MHz.
Steps typically are 0.1 unless doing wide band, when .2, .5, or 1.0 is faster. Widen frequency to see harmonics that resonate.
A chart pops-up with SWR, impedance, and a curve.



You don't like results. You want the SWR low point at 146 Mhz.
Low now is to left, a lower frequency.
To raise frequency, shorten the radiator and return. Guess at 19.2".
Change Wires length and run SWR again.
What a good choice. SWR = 1.57, with low near 146 MHz.



Click Fast Fourier (FF) Plot for angles and gain of 7.7 dB.
More lobes come from multiple wavelengths in elevation.



Click Wires to move, scale, make radials, catenary.

Click Alt SWR Z0 for a matching Z such as 9:1 transformer.
9 * 50 = 450Ω as alt. Then try it on SWR screen.

Does the result make sense? Eznec outputs whatever you input.
Life is good. Enjoy!

WIRE S										
No.	End1				End 2				Dia	Segs
	X (in)	Y (in)	Z (in)	Conn	X (in)	Y (in)	Z(in)	Conn	(in)	
1	0	0	144	W2E2	0	19.2	144		#14	199
2	0	-19.2	144		0	0	144	W1E1	#14	199