SLAARC Antenna Modeling Demo

March 14, 2021 on Zoom

Antennas are a critical component for any Amateur Radio Operator, and last year I decided that I wanted to better understand how to use antenna modeling software to help me create reliable antennas for my use. I've only been modeling since last Christmas, so I'm new at this too. But I can provide you some information on why you might want to learn to model, the very basics of modelling (ie what are wires and segments) as well as a demo.

As far as I can tell, there really are 2 *predominant* antenna modeling programs that are in use in the amateur radio community:
1. 4nec2 available for free on the internet and somewhat limited in the allowed complexity of the model.
2. EZNEC and its various versions available from W7EL for prices ranging from $100 to $700. There is also a **free demo program**. Also, there is an EZNEC companion program called AutoEZ for $80 with allows Excel macros to control EZNEC by varying inputs by scalars or equations and running multiple inputs in a batch. AutoEZ will not be part of this presentation.

I purchased EZNEC 6 plus ($150) plus AutoEZ because my first major project was a 160-meter 4 square vertical array with an elevated radial field and I needed the segment quantity (2000 segments). Also, I'm working on the hexbeam I discussed in December and a high gain yagi to receive signals from a TV station in Canada with programming I am interested in seeing.

I cannot advise anyone on the alternative modeling software ... most may want to start with freeware (4nec2)...which I've never learned or used. But you could try EZNEC demo to get your feet wet. (No, no kickbacks from W7EL). The fundamentals of modeling will be the same across programs, it's likely just learning a different user interface and the inherent limitations of that modeling software.

Here is a big head start if you decide to learn modelling. Most antennas that you will want to model already have models designed for them. They may be in a different band or optimized for a different part of the band, but these are readily revised. Some are packaged with the modeling software along with text on how to manipulate them to your ends. Some come from the ARRL Antenna Book on a free cd that comes with it. Some can be downloaded from the web. You will always start from a designed model and revise it. In fact, EZNEC won't even allow you to start with a clean sheet of paper, only another model.

So here is how I will give this presentation:

1. I will give a demo of EZNEC+ and do a Q&A as long as "I dunno" is an acceptable answer to some of your questions...I'm a novice in modeling too.
2. The demo will be of an NVIS 40-meter antenna which another club has used in field day activities. Doug (KM4LKC) has given me the antenna parameters ahead of time and I will show you how to input these and show you the results including radiation patterns, SWR, and resonant frequency.
3. Also, I will show you how much learning can occur using antenna modeling by doing sensitivity analysis on various parameters.
4. I can provide a list of recommended readings to get you started if you wish…there are a series of 4 articles, by LB Cebik, published in QST on Learning Antenna modelling. (John NU8M provide URL) LB Cebik also has a website which has a plethora of information on modeling.

73,

Bob Kiessel
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Antenna Modeling Agenda

1) Walk through EZNEC interface—focus on inputs and outputs. Also antenna notes for tracking.

2) Base antenna model (model1) with all the parameters shown. Walk through where all the parameters are entered. Use this model to show what happens with height changes. Provide a page with all the parameters.

3) Revised model2 with 110* inverted V ilo 117* show changes to impedance, Fr, and radiation pattern/gain.

4) Revised model3 with 90* inverted V ilo 110* show changes to impedance, Fr, and radiation patterns/gain.

5) Revised model4 (at 90*) with length change to resonate at desired frequency.

6) Using model 1, show what happens with various ground assumptions.