

An Introduction to EZNEC

Antenna Modeling for the Radio Amateur

Rick Hiller – W5RH



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What are our antenna design goals?

- **Resonance**
- **Low SWR (matched to feedline)**
- **Gain (maximized)**
- **Angle of radiation for the main lobe**
- **Elimination of noise (f/B ratio)**

Antenna modeling can help you attain any or all of these antenna attributes in your next design.

Antenna Modeling

- **EZNEC – A PC based application to design, test, troubleshoot and learn about antennas**

“E Z” NEC

- **The “Interface” to the NEC Engine**

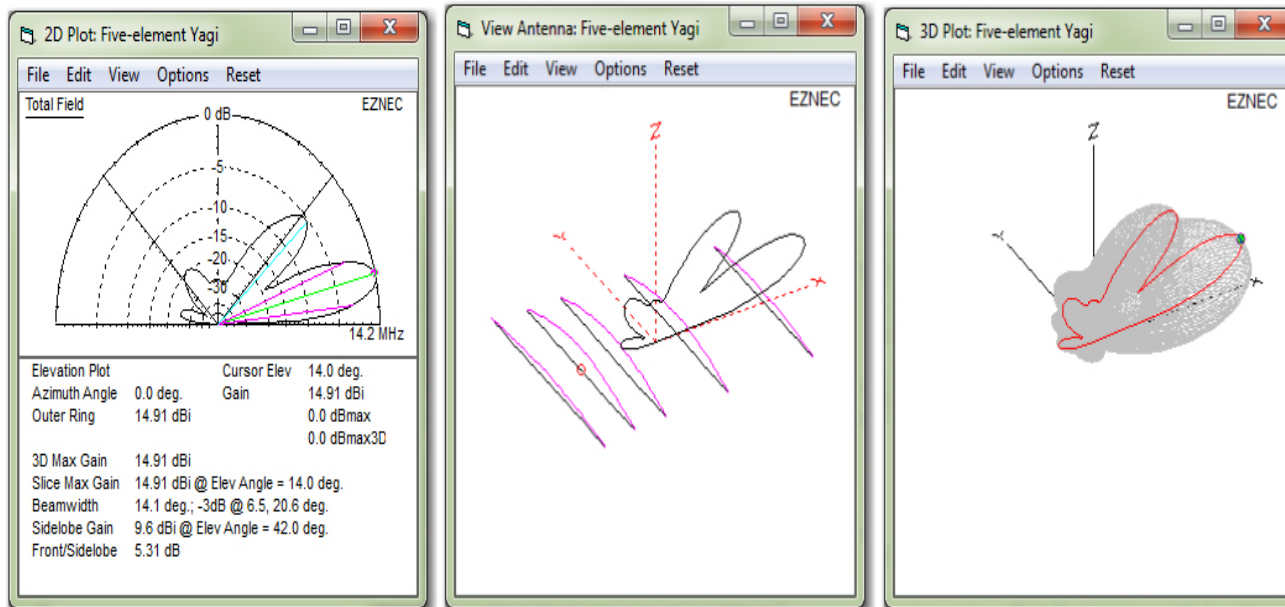
- **Numerical Electromagnetics Code**
- **Statistical Estimations -- Method of Moments**
- **NEC – written 1970 at Lawrence Livermore Lab**
- **Now, up to version 4 (licensed Pro version)**

- **EZNEC.com Roy Lewallen W7EL**

- **Versions – Free, Standard and Professional**

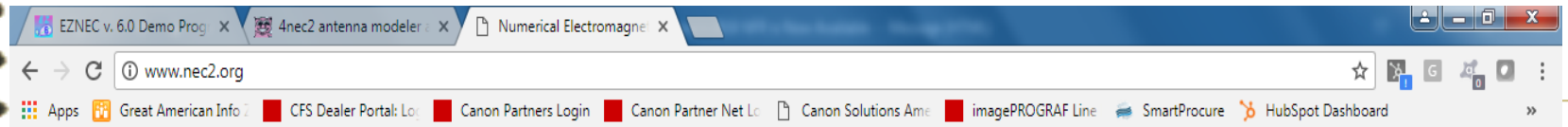
EZNEC web page www.eznec.com

EZNEC Antenna Software by W7EL
~~ NEW! v. 6.0! ~~



Above: Screen shots from several **EZNEC v. 6.0** displays. **Right:** 3D far field pattern, with 2D elevation "slice" highlighted. Any azimuth or elevation slice can be highlighted. **Center:** View Antenna display, showing the "wires" making up the model of the five-element beam, with currents and 2D slice superimposed to show orientation. Several other items, such as currents and wire numbers, can be added to this display. **Left:** 2D display showing detailed information about the selected slice.

NEC Engine Info www.nec2.org



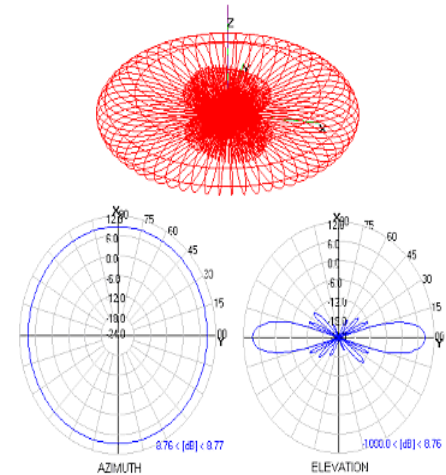
Numerical Electromagnics Code (Method of Moments)

NEC simulates the electromagnetic response of antennas and metal structures.

Jerry Burke and A. Poggio wrote the NEC/MOM family of programs at Lawrence Livermore Labs in 1981, under contract to the US navy. NEC2 was later released to the public and is now available on most computing platforms.

This website gathers together NEC2 documentation and code examples from a group of leading scientists and engineers

Please send contributions or questions to [Trevor Marshall](#),
the webmaster



[Link here for information](#) and instructions on **how to run NEC2 in a Microsoft Windows environment**. There is also a sample NEC model that you can use to test your setup.

Take a look at my [tutorial for BYTE.com](#) describing **antennas for WLAN deployment**

The BiQuad antenna is a simple 2.4GHz WLAN antenna suitable for for 802.11 use. Details on how to construct this antenna, both as stand-alone and as a parabolic dish feed [can be found at this link](#). The NEC simulation model, and sample output, [can be found here](#).

An HTML version of the **Users Manual for NEC** has been created by [Peter Richeson](#).
There are three parts to the manual:

Part I:

NEC Program Description - Theory

1. [HTML Version](#)
2. [PDF Version](#) (view with a left mouse click, download with right click-save target)

Part II:

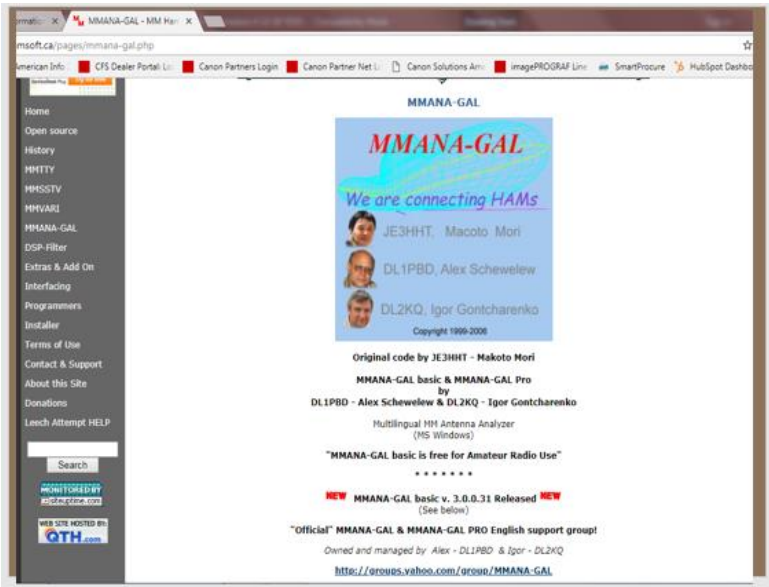
NEC Program Description - Code

1. Not available yet

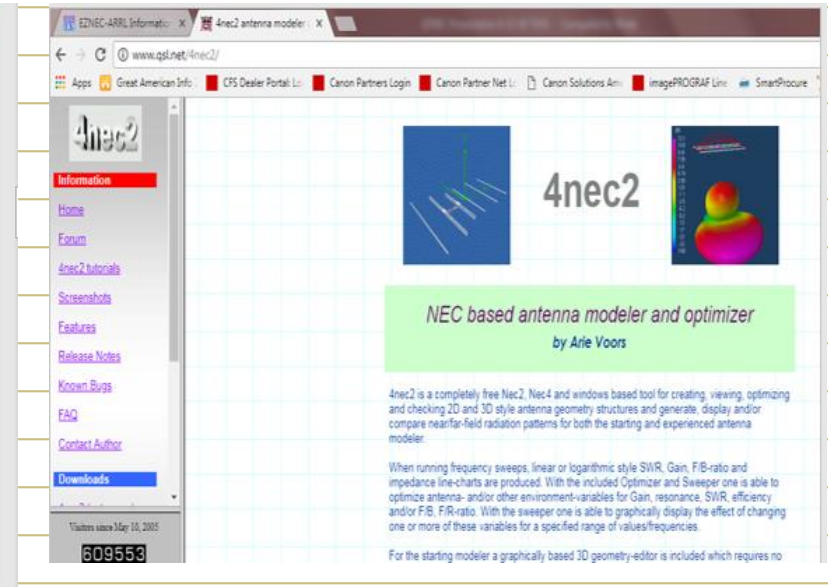
“Free” modeling programs

MMANA-GAL

4NEC2



The screenshot shows the MMANA-GAL website. The browser address bar displays 'msof...ca/pages/mmmana-gal.php'. The page features a central graphic with the text 'MMANA-GAL' and 'We are connecting HAMS'. Below this, it lists contributors: JE3HHT, Macoto Mori; DL1PBD, Alex Schewelew; and DL2KQ, Igor Gontcharenko. It also states 'Original code by JE3HHT - Makoto Mori' and 'MMANA-GAL basic & MMANA-GAL Pro by DL1PBD - Alex Schewelew & DL2KQ - Igor Gontcharenko'. A sidebar on the left contains navigation links such as 'Home', 'Open source', 'History', and 'Contact & Support'. At the bottom, it mentions 'Official MMANA-GAL & MMANA-GAL PRO English support group!' and provides a URL: 'http://groups.yahoo.com/group/MMANA-GAL'.



The screenshot shows the 4NEC2 website. The browser address bar displays 'www.qsl.net/~4nec2/'. The page features a central graphic with the text '4nec2' and 'NEC based antenna modeler and optimizer by Arie Voors'. Below this, it states '4nec2 is a completely free Nec2, Nec4 and windows based tool for creating, viewing, optimizing and checking 2D and 3D style antenna geometry structures and generate, display and/or compare near-far-field radiation patterns for both the starting and experienced antenna modeler.' A sidebar on the left contains navigation links such as 'Information', 'Home', 'Forum', '4nec2 tutorials', 'Screenshots', 'Features', 'Release Notes', 'Known Bugs', 'FAQ', and 'Contact Author'. At the bottom, it mentions '4nec2 version 3.0.0.31 Released' and '609553'.

EZNEC Demo

- Antenna “wires” Definition -- X,Y,Z
- Define “source(s)” -- feedpoint(s)
- Specify global definitions (units, plot type)
- Specify output display characteristics
- Various antenna results – graphic and numerical

Antenna Modeling with EZNEC

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References

EZNEC.com

4NEC2.com

MMANA-GAL.com

NEC2.org

ARRL Antenna Handbook

ARRL Antenna Compendiums

QST Articles – QST Search

ANTENNAS (2nd) – Krause

Antenna Modeling Course (*Google this*)

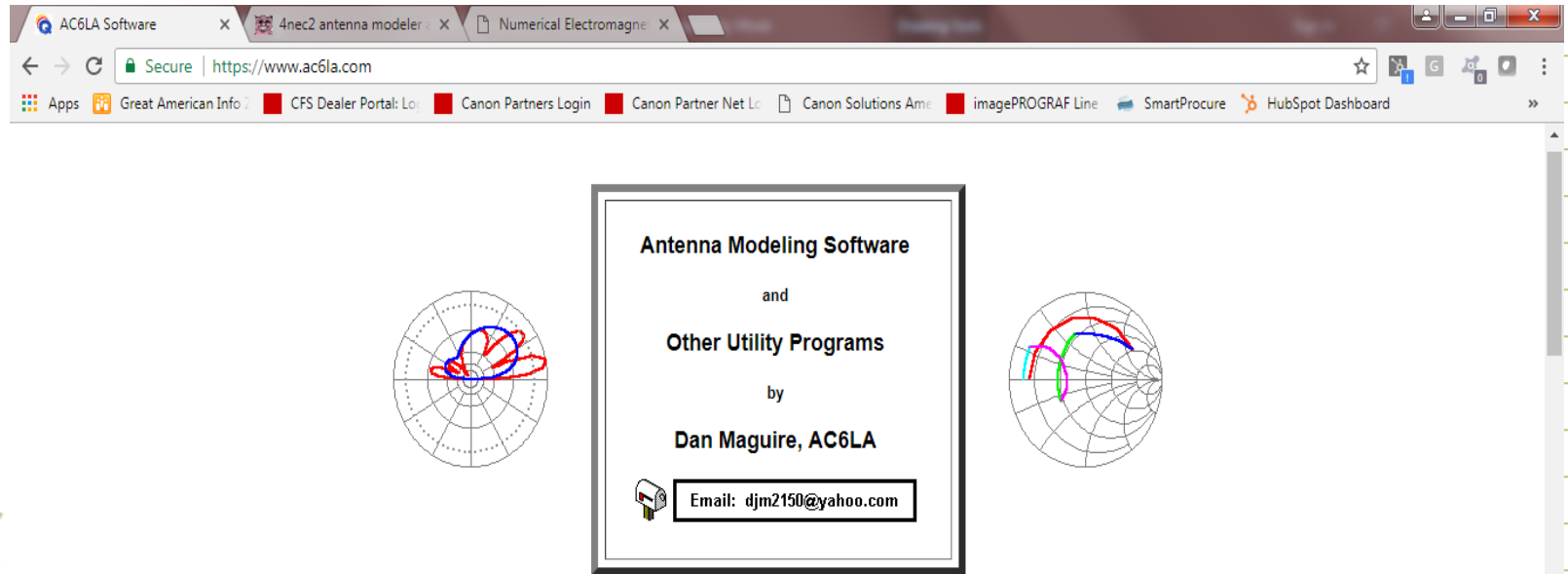
How to Start Modeling Antennas using EZNEC

Greg Ordy, W8WWV Contest University Dayton 2011

Additional Information

- ON4UN's Low-Band Dxing (5th edition)
- ARRL Antenna Book (special EZNEC V6)
- EZNEC Manual
- QST Articles – Ward Silver
- W4RNL – Cebik Articles online
- Antenna Designs – Directly Fed Yagi's
 - Array of Light book– N6BT
 - Jason Johnson – Optibeam UK web site
- Ancillary Programs – AutoEZ --AC6LA

AC6LA.com – Dan Maguire



AC6LA Software x 4nec2 antenna modeler x Numerical Electromagne x

Secure | <https://www.ac6la.com>

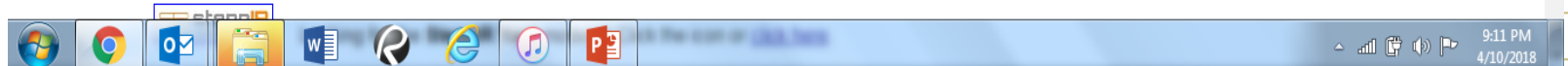
Apps Great American Info CFS Dealer Portal: Log Canon Partners Login Canon Partner Net Lo Canon Solutions Ame imagePROGRAF Line SmartProcure HubSpot Dashboard

Antenna Modeling Software
and
Other Utility Programs
by
Dan Maguire, AC6LA
Email: djm2150@yahoo.com

- [AutoEZ - Automated use of EZNEC](#)



AutoEZ works in conjunction with the EZNEC antenna modeling program and allows you to use variables to control diverse aspects of the model. You can then run multiple EZNEC test cases while AutoEZ automatically changes one or more variables between runs. AutoEZ can take full advantage of all the features in EZNEC v. 5.0 and v. 6.0 such as virtual wires, realistic transmission lines with loss, transformers, L networks (which can be combined to form T and Pi networks), and parallel connected loads.



9:11 PM
4/10/2018

The Radio Hotel

Written by W5RH

A Monthly Column in the BVARC Beacon

Articles about Antennas, transmission lines
and matching networks

www.bvarc.org/newsletters.php



March 22 and 23

