MOUNTAIN
SPARK
GAPS

NPARC—The Radio Club for the Watchung Mountain Area

Website: http://www.nparc.org
Club Calls: N2XJ, W2FMI

VOLUME 50 NO.2 February 2015

UPCOMING EVENTS

Regular Meetings

3/9 & 3/23
Monday 7:30
NP Community Center

Meeting Schedule

Regular Meeting: 7:30—9:00 PM
2nd Monday of each month at the
NP Senior & Adult Center
15 East Forth Street
New Providence

Informal Project Meeting: 7:30—9:00 PM
4th Monday of each month
Same location
Everyone is Welcome
If a normal meeting night is a holiday, we usually meet the following night. Call one of the contacts below or check the web site

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Club Officers for 2015

President: KC2WUF David Bean
973-747-6116
Vice President:K2UI Jim Stekas
973-377-4180
Secretary: KD2EKN Tim Farrell
908-244-6202
Treasurer: K2YG Dave Barr
908-277-4283
Activities: W2PTP Paul Wolfmeyer
201-404-6914

On the Air Activities

Club Operating Frequency
145.750 MHz FM Simplex

Sunday Night Phone Net
Murray Hill Repeater (W2LI) at 9:00 PM
Transmit on 147.855 MHz
With PL tone of 141.3 Hz
Receive on 147.255 MHz
Net Control K2AL

Digital Net
First & Third Mondays 9 PM
Details as announced.

Club Internet Address

Website:http://www.nparc.org
Webmaster K2MUN David Berkley
Reflector: nparc@mailman.qth.net
Contact K2UI, Jim

MOUNTAIN SPARK GAPS

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Editor: K2EZR Frank McAneny
Contributing Editors:
WB2QOQ Rick Anderson
WB2EDO Jim Brown

Climatological Data for New Providence for January 2015

The following information is provided by Rick, WB2QOQ, who has been recording daily weather events at his station for the past 33 years.

TEMPERATURE -
Maximum temperature this January, 51 deg. F (January 4)
Last January(2014) maximum was 59 deg. F.
Average Maximum temperature this January, 34.8 deg. F
Minimum temperature for this January, 2 deg. F (January 8)
Last January(2014) minimum was 0 deg. F.
Average Minimum temperature this January, 17.9 deg. F
Minimum diurnal temperature range, 4 deg. (36-32 deg.) 1/12
Maximum diurnal temperature range, 29 deg. (36–7 deg.) 1/29

Average temperature this January, 26.4 deg. F
Average temperature last January, 25.0 deg. F

Number of days this January with daily minimum temperatures of
20 deg. or lower – 19; last January – 21.
4 days this January saw temperatures in the single digits; last Jan., 9 days.
6 days this January saw maximum temperatures below 32 degs.; last Jan.,15 days.

PRECIPITATION -
Total precipitation this January – 11.3" snow; 4.63" rain/melted snow.
Total precipitation last January – 16.3" snow; 2.85" rain/melted snow.

Maximum one day precip. event this January; January 24, 5.0" snow.
Measurable rain fell on 3 days this January, 6 days last January.
Measurable snow/sleet fell on 7 days this January.

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Rick Anderson
2/5/14
243 Mountain Ave.
New Providence, NJ

Numerical Antenna Modeling

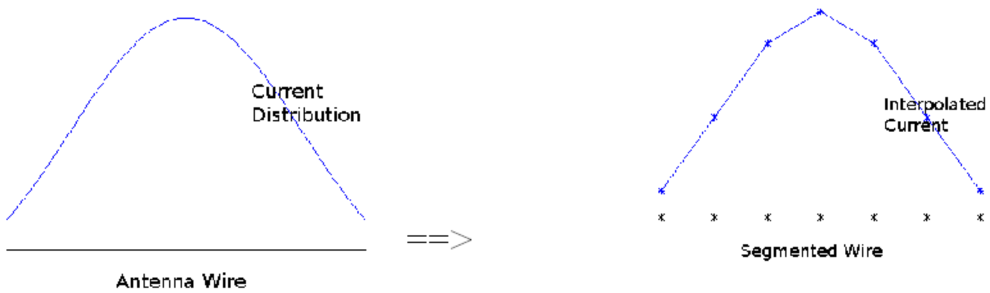
Jim Stekas –K2UI

Previously, we discussed how Serge Schelkunoff's and R. W. P. King used classical analytic methods to solve antenna problems. Mathematical analysis is still used to provide insight into new types of antennas (e.g. broadband antennas based on fractals) but virtually all the “heavy lifting” is done using numerical computer models.

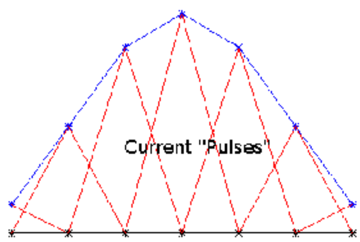
The fundamental equation to be solved is to find a current distribution, ***I(x)*** that produces a sinusoidal field, ***A(x)*** along the wire (or wires), which is mathematically stated as:

$$A(x) = -jV_{in}\sin|kx| + C\cos(kx) = 60\int_{-h}^{h} I(x')K(x-x')dx'$$

The field ***A(x)*** is fully specified by a voltage, V_{in}, and an unknown constant, C, that will be adjusted to make the current zero at the ends of wires. The hard part is finding an inverse of the integral on the right hand side. The approach taken in NEC, and all numerical models, is to divide the wire (s) into segments and replace the integral with a sum over segments.



In the above example, the wire is divided into 6 segments, with 7 endpoints. Assume that the current changes linearly between the endpoints and we get a pretty good representation of the continuous current distribution so long as the length of the segments is much less than a wavelength. The next step is to express the segment currents as being composed of triangular “impulses” as shown below.



Using the triangular current impulses, we can break up the integral into a sum over integrals of all the little triangles:

$$A(x_m) = 60\sum_n I_n \int tri(l) K(l + x_n - xm) dl$$

Here ***tri(l)*** is a triangle shaped function of unit height and I_n is the value of the current at x_n. This equation can be written as the matrix equation:

$$A(x_m) = \sum_n K_{mn} I_n$$

Where the matrix elements

$$K_{km} = 60\int tri(l) K(l + x_n - x_m) dl$$

are easily computed numerically or by hand!). The solution is now found by inverting the matrix ***K*** and computing two current distributions that generate the two terms of ***A(x)***

$$I_m^S = \sum_n K_{mn}^{-1} \sin|kx_n| \qquad I_m^C = \sum_n K_{mn}^{-1} \cos(kx_n)$$

These are combined to give a solution for the total current generating ***A(x):***

$$I_m = -jV_{in} I_m^S + C I_m^C$$

Given V_{in}, the final step is to pick the constant ***C*** so that current is zero at the ends.

$$0 = -jV_{in} I_{end}^S + C I_{end}^C$$

So long as the segment lengths are much larger than the wire diameter, K_{nm} will be very large when ***n=m*** and much smaller otherwise with the result that ***I(x) ~ A(x)*** . For a half wave dipole the ***cos(kx)*** term goes to zero at the wire ends, and I^C_{end} is very small. Similarly the ***sin(kx)*** term goes to one at the wire ends, and I^S_{end} is "large". As a result the constant ***C*** must be very large to achieve the current end constraint for a half wave dipole. This corresponds to a very high resonant current I^C in a half wave dipole, which is a common approximation for calculating radiation patterns.

The numerical results for a half wave dipole are basically the same as Schelkunoff's transmission line analogue, but the physical intuition is hidden in the boundary constraint on the wire ends. So the bottom line is: visualize the operation of an antenna as Schelkunoff did, and then use NEC to grind out the details.

Vaccination Proven Safe

A new analysis of 166 studies on childhood vaccines has come to a resoundingly clear conclusion: Vaccination does not cause autism and is extremely safe and effective. The Agency for Healthcare Research and Quality commissioned a systematic review on the subject in response to the rise of the anti-vaccine movement, which has been blamed for recent outbreaks of measles and whooping cough across the country. Researchers looked at dozens of the most scientifically rigorous studies on vaccinations conducted since a similarly comprehensive 2011 review. They found no link between the measles vaccine and autism; in fact, children who did not receive the vaccine had the same incidence of autism as kids who did. “Adverse effects” from vaccination do occur, including fever-related seizures and intestinal blockages, but the study found these reactions were “extremely rare” and treatable. Clearly, the authors wrote, the benefits of vaccination far outweigh the tiny risk of side effects. “The childhood diseases vaccinations prevent, they pointed out, can cause “blindness, deafness, developmental delay, epilepsy, or paralysis and may also result in death.”

“There is a lot of misinformation out there,” co-author Margaret Maglione tells USA Today. “Anyone can put anything on the internet.” As we all know, the amount of misinformation on the internet is legion. It is always a good idea to check such information out thoroughly before accepting it as true.

Why Plants Can Hear

Scientists have long known that some plants react to sound. What they didn’t know is why. But a new study indicates that the phenomenon may be linked to a plant’s ability to fend off predators. According to the report, certain plants respond to the sound of caterpillars eating leaves by emitting caterpillar-repelling chemicals. Researchers from the University of Missouri and Columbia University played recordings of the insects eating to one set of plants and kept another set in silence. Later, when caterpillars began feeding on the leaves, the plants that had been exposed to the eating noises produced more repellent chemicals than the control set. This suggest that the chomping sounds had put the plants on alert for potential danger, The fact that the sound of wind or other insects did not elicit the same response implied that the plants could sense the difference between predator sounds and atmospheric noises. The plants were also highly sensitive, responding to sounds that vibrated the leaf up and down by less than 1/10,000 of an inch. The research team now hopes to establish precisely how the plants detect such minute noises.

Jim WB2EDO