EZNEC Antenna Examples for Field Interference Management

The following EZNEC models of isolation of multiple antennas for the same band for Field Day are available which result in finite or measurable coupling between antennas (coupling between an active transmit antenna and a victim RX antenna)

under ideal simulation conditions using a real average ground model

- Verticals for 80/40/20 meters at 300 & 600 feet separation
- End-to end dipoles for 80/40/20 meters at 300 & 600 feet separation at 25 and 50 feet in height
- Inverted vees for 80/40/20 meters at 300 & 600 feet separation at 25 and 50 feet in center height
- Dipole at 25 and 50 feet in height and vertical for 80/40/20 meters at 300 & 600 feet separation
- Vertical with dipole at 25 and 50 feet height off the end with tilt to enhance isolation for 80/40/20 meters at 300 & 600 feet separation
- 3- element Yagis on 20 meters side-by-side at 25 & 50 feet in height separated by 300 and 600 feet

The following cross polarization examples are very useful for Field Day but models are not included since under ideal conditions the isolation is very high (except for examples for 80 meters at 300 feet spacing and with 50 feet height). However, realistic conditions will result in noticeable/significant coupling in the field. One area of possible useful study is the effect on isolation caused by loss of ideal cross-polarization due to errors in positioning.

- Dipoles in ideal cross polarization
- Inverted Vees in ideal cross polarization
- Dipole in ideal cross polarization with an inverted vee
- Dipole in ideal cross polarization with a vertical
- Inverted vee in ideal cross polarization with a vertical

Each model can be loaded into EZNEC and outputs generated and modified for similar setups. These results are over an average ground. The ground can be set to other conditions to see the impact. **For Field Day isolation, the key output is the antenna current at the load (equivalent of signal at the coax for the RX) for the victim antenna (which should be taken from the antenna segment o the victim antenna where the load is located). The current on the victim antenna output can be easily converted into dB's of isolation by using the common formula 20 * Log10 (I).** Open the Current tab and look for the correct wire in the victim antenna and then for the segment where the load is located (this is usually the segment with the highest current).

80 meter verticals

Separation	Victim Antenna Current	dB Isolation
300	0.056	25 dB
600	0.026	32 dB

40 meter verticals

Separation	Victim Antenna Current	dB Isolation
300	0.026	32 dB
600	0.0099	40 dB

20 meter verticals

Separation	Victim Antenna Current	dB Isolation
300	0.0094	41 dB
600	0.0031	50 dB

- This shows antennas in the same polarity and broadside have poor isolation and are not appropriate for Field Day

80 meter dipoles end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.018	35 dB
25	300	0.0077	42 dB
50	600	0.0023	53 dB
25	600	0.002	54 dB

40 meter dipoles end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.0053	46 dB
25	300	0.0026	52 dB
50	600	0.00077	62 dB
25	600	0.00073	63 dB

20 meter dipoles end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.002	54 dB
25	300	0.00077	62 dB
50	600	0.00028	71 dB
25	600	0.0002	74 dB

- End-to end dipoles improve isolation but still have significant coupling, especially on the lower bands – distance improves isolation – the effect of height may improve or degrade isolation

80 meter inverted vees end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.0062	44 dB
25	300	0.0093	41 dB
50	600	0.0062	44 dB
25	600	0.0052	46 dB

40 meter inverted vees end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.0019	54 dB
25	300	0.0071	43 dB
50	600	0.0015	56 dB
25	600	0.0031	50 dB

20 meter inverted vees end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.0016	56 dB
25	300	0.0014	57 dB
50	600	0.00048	66 dB
25	600	0.0006	64 dB

- - inverted vees end to end will usually degrade isolation compared to dipoles end to end, but this is not always the case

80 meter vertical to dipole end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.0071	43 dB
25	300	0.010	40 dB
50	600	0.0026	52 dB
25	600	0.0060	44 dB

40 meter vertical to dipole end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.0011	59 dB
25	300	0.0029	51 dB
50	600	0.00075	62 dB
25	600	0.0018	55 dB

20 meter vertical to dipole end to end

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.0012	58 dB
25	300	0.00085	61 dB
50	600	0.00033	70 dB
25	600	0.00049	66 dB

- A dipole end to end to a vertical provides improved isolation similar to end to end dipoles

80 meter vertical to dipole end to end tilted (Dipole end 1 closest to vertical)

Height	Separation	Victim Antenna Current	dB Isolation	End 1 (feet)	End 2 (feet)
50	300	0.00053	66 dB	53.45	62.59
25	300	0.00054	66 dB	35.32	30.75
50	600	0.00015	76 dB	57.18	50.86
25	600	0.00015	76 dB	37.59	24.71

40 meter vertical to dipole end to end tilted (Dipole end 1 closest to vertical) End 1 (feet) End 2 (feet)

Height	Separation	Victim Antenna Current	dB Isolation		
50	300	0.00017	75 dB	48.84	51.87
25	300	0.00018	75 dB	29.02	23.27
50	600	0.000075	82 dB	51.44	46.83
25	600	0.00004	88 dB	30.73	20.98

20 meter vertical to dipole end to end tilted (Dipole end 1 closest to vertical) End 1 (feet) End 2 (feet)

Height	Separation	Victim Antenna Current	dB Isolation		
50	300	0.000064	84 dB	47.34	50
25	300	0.000060	84 dB	25.15	22.34
50	600	0.000036	89 dB	48.59	47.63
25	600	0.000022	93 dB	25.96	21.18

- Tilting of the dipole that is end-to-end to a vertical can increase isolation considerably. In ideal simulation conditions this improvement may not be limited. For realistic field conditions, this may have significant limitations. Using an 80/40/20/15/10 meters trap dipole 600 feet from verticals, with the near end at 30 feet and the far end at 25 feet, W3CWC was able to achieve close to 70 dB of isolation on all bands with the compromise tilting. Note that the best tilting performance is achieved by unequal rotations of the 2 sides of the dipole about the center.

20 meter Yagi's placed side to side (using Cushcraft A3S models)

Height	Separation	Victim Antenna Current	dB Isolation
50	300	0.0016	56 dB
25	300	0.00040	68 dB
50	600	0.00020	74 dB
25	600	0.00013	78 dB

- Yagi's placed side-to-side can improve isolation slightly compared to end-to-end dipoles, but only by a few dB for this 20 meters study

Cross Polarization Models for 80 Meters at 300 feet Separation at 50 feet height

80 meter Dipoles in ideal cross polarization

80 meter Inverted Vees in ideal cross polarization

80 meters Dipole in ideal cross polarization with an inverted vee

80 meters Dipole in ideal cross polarization with a vertical

80 meters Inverted vee in ideal cross polarization with a vertical