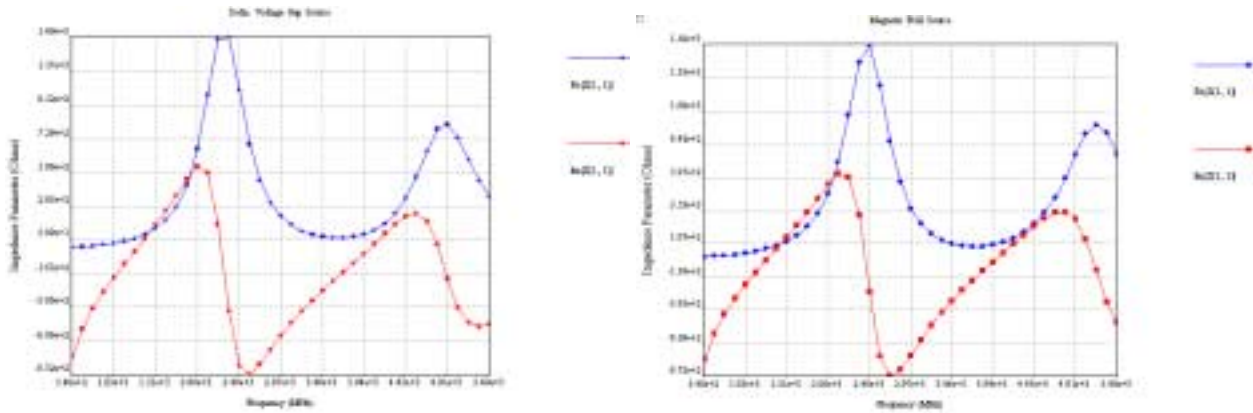


SINGULA Benchmark Simulation Examples

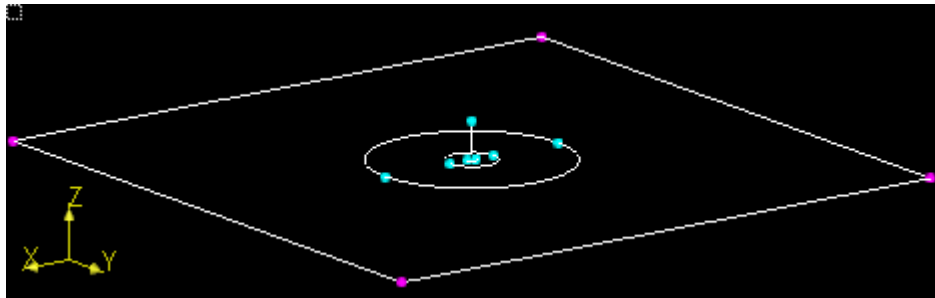
The benchmark examples in this file are performed by using SINGULA v6.2 Electromagnetic Simulation on Window system.

SINGULA is a 3-D full-wave electromagnetic simulation based on CFIE integral equation and the method of moments.

Example One: Dipole antenna of 11cm length with radius 0.22mm

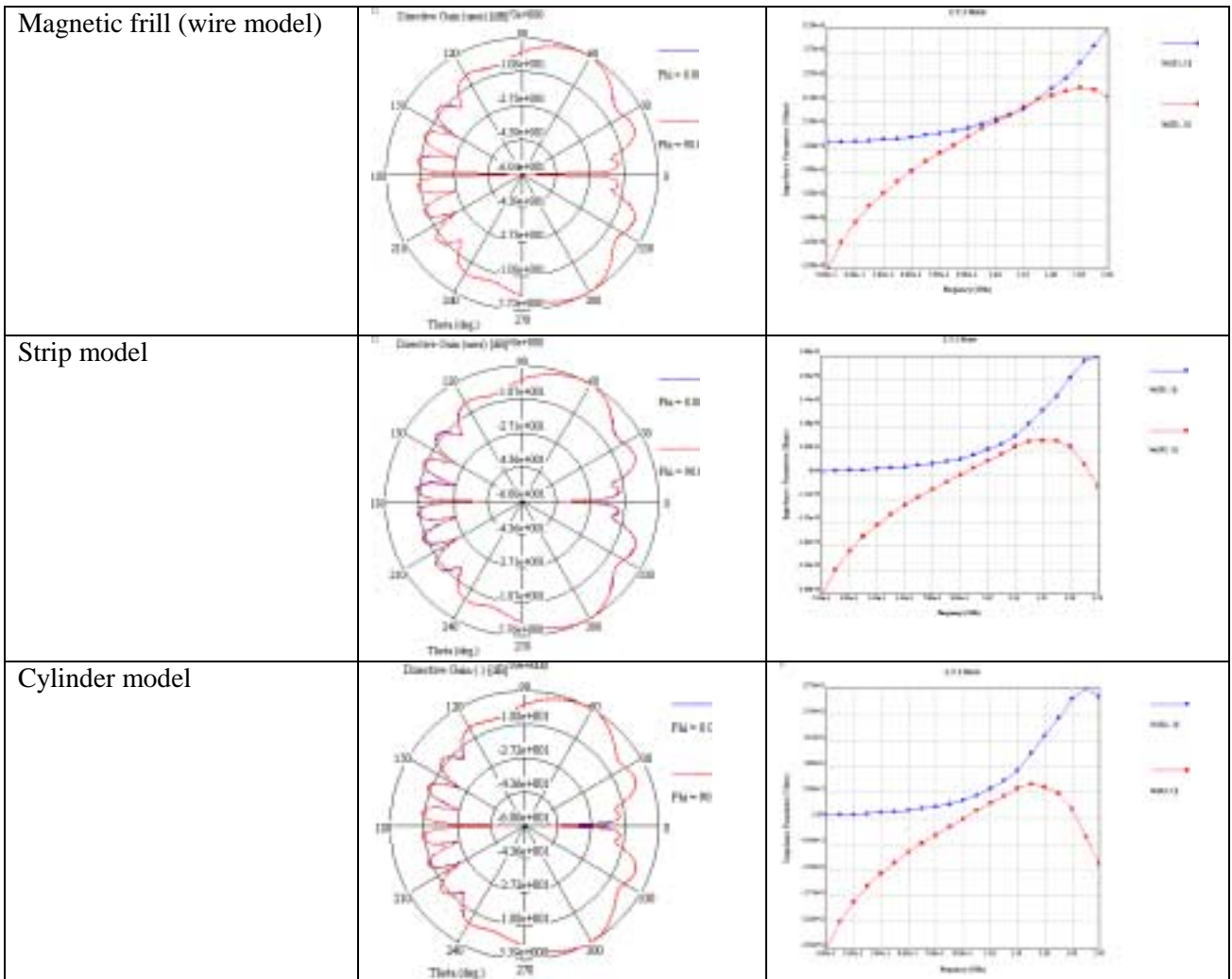


Example Two: $\lambda/4$ monopole antenna with a finite square ground plane of 1.22m length size at 1GHz frequency

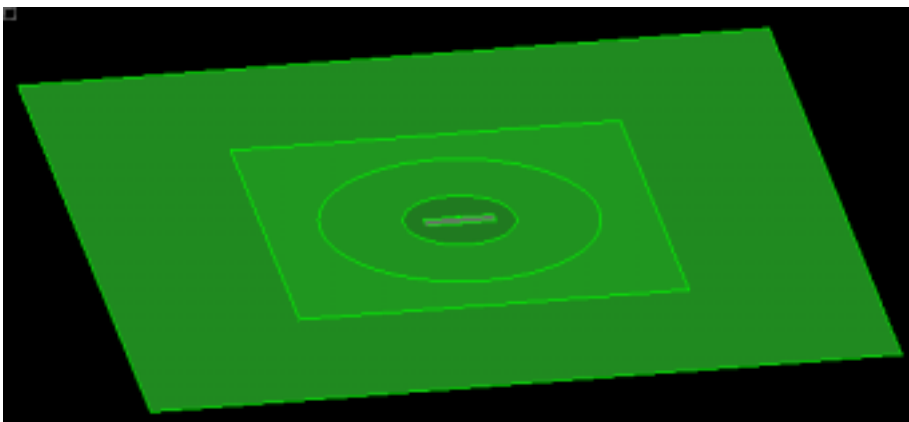


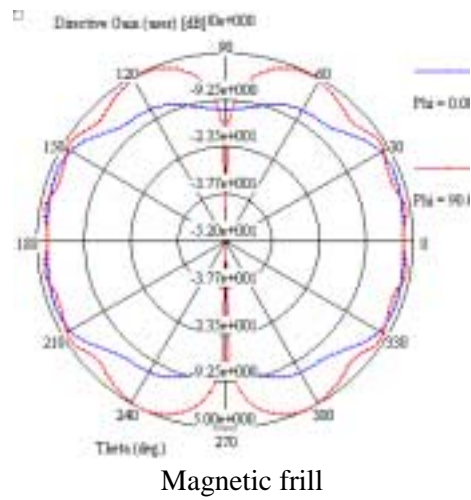
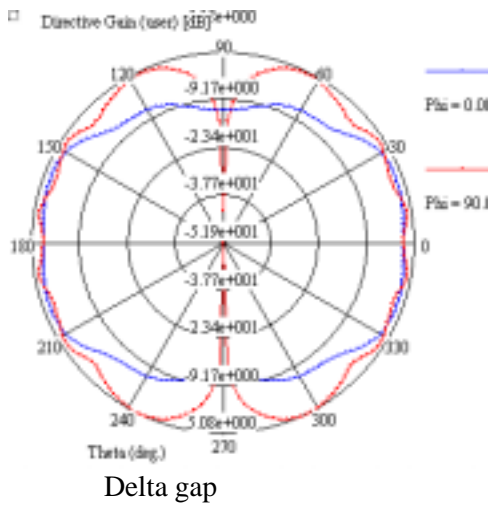
The model geometry:

Model type	Directive gain	Impedance parameter
Delta gap (wire model)		

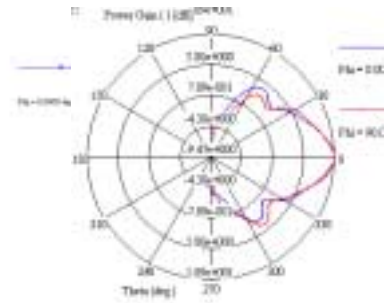
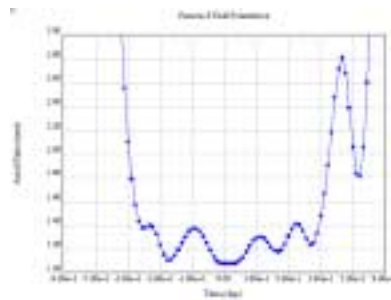
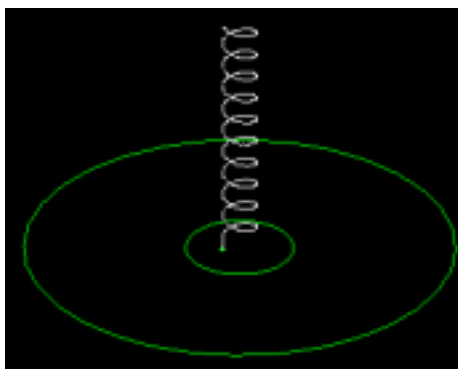


Example Three: Single slot antenna with finite square ground plane.

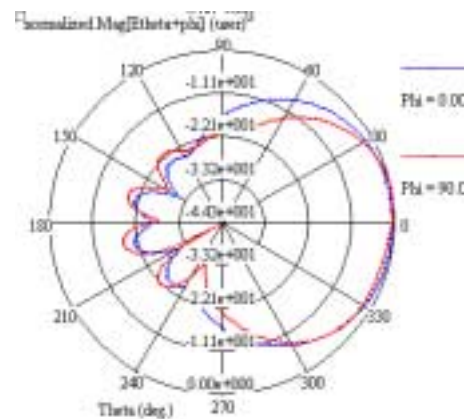
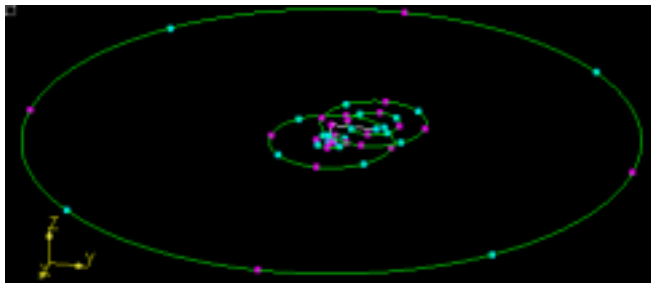




Example Four: Helix antenna with finite square ground plane.

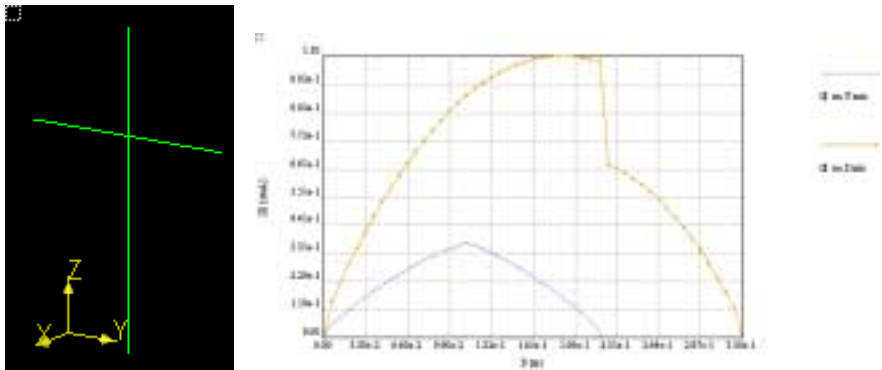


Example Five: L-probe antenna.

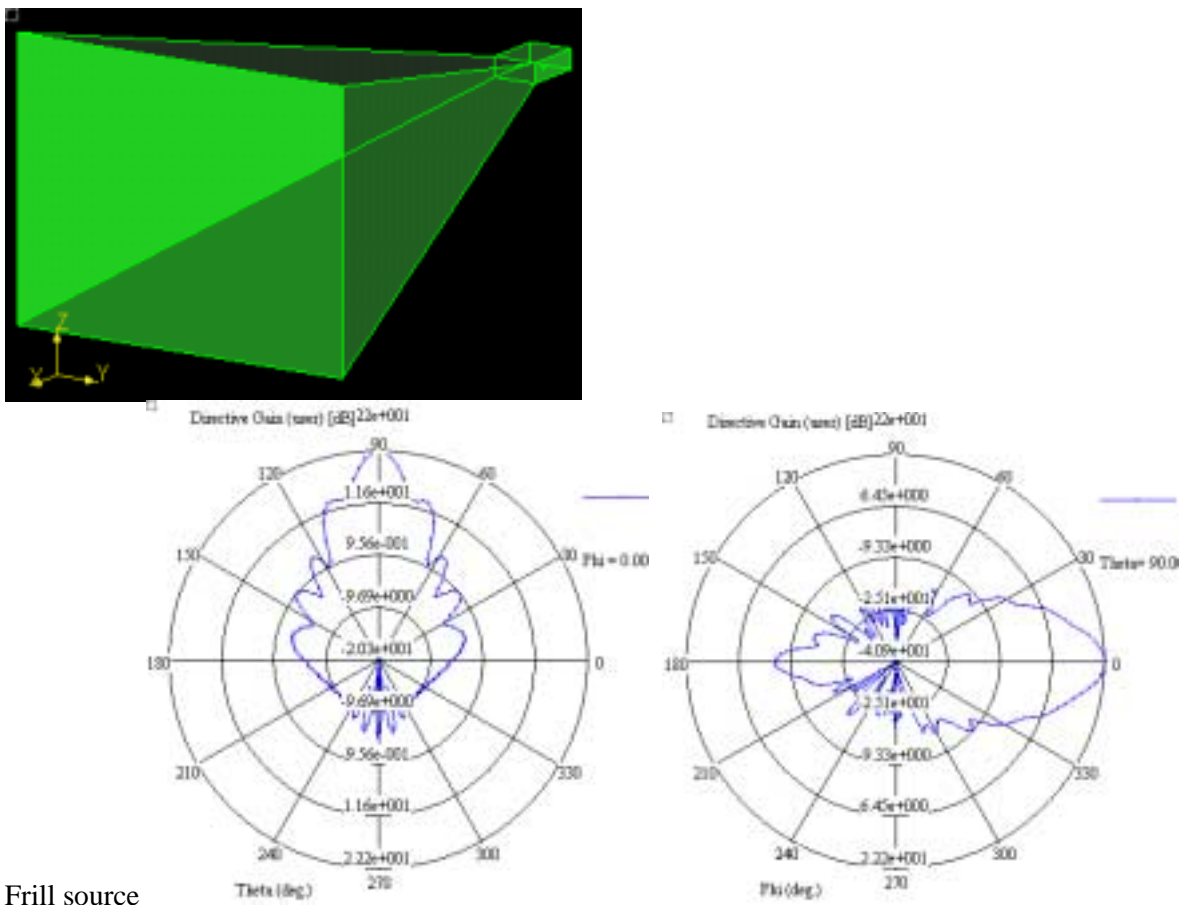


The directive gain of the antenna is 9 dB.

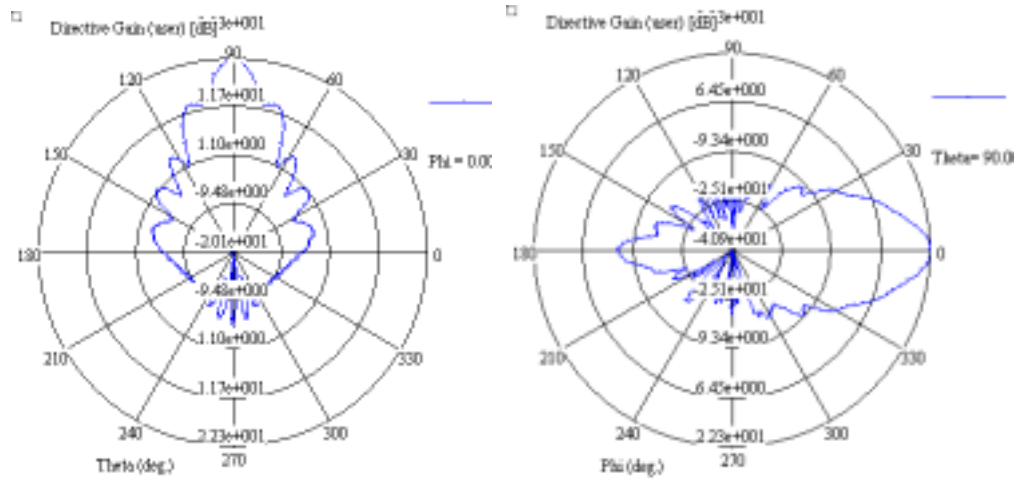
Example Six: Wire junction antenna.



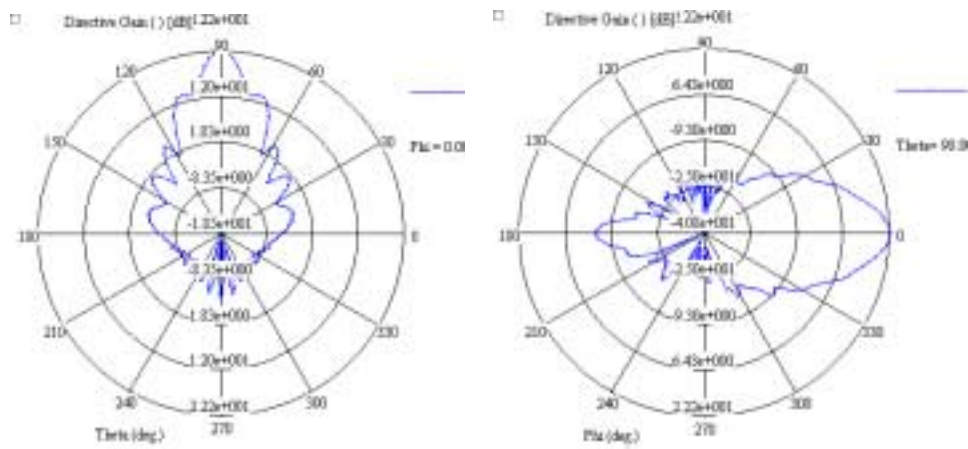
Example Seven: WR90 horn antenna.



Frill source

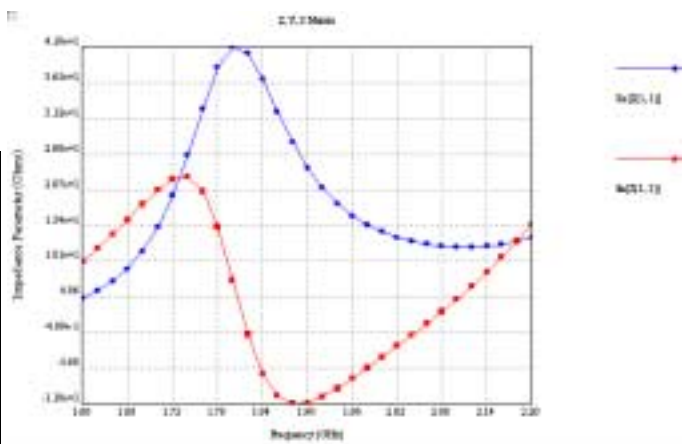
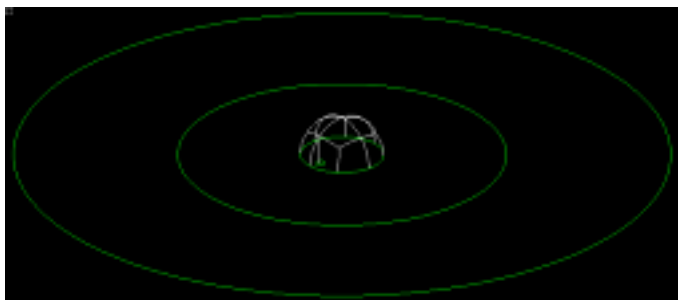


Delta-gap

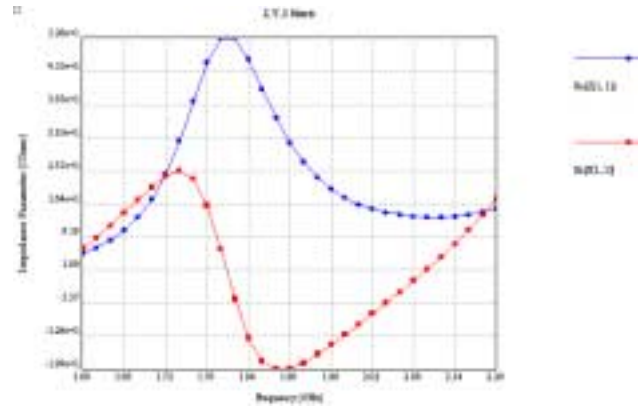
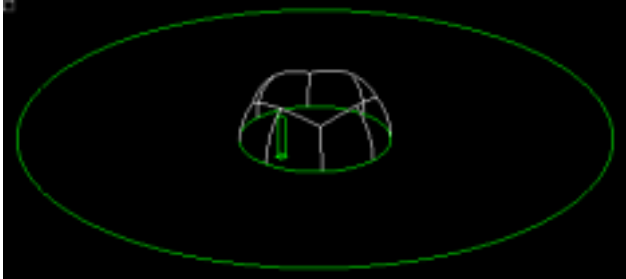


Coaxial feed

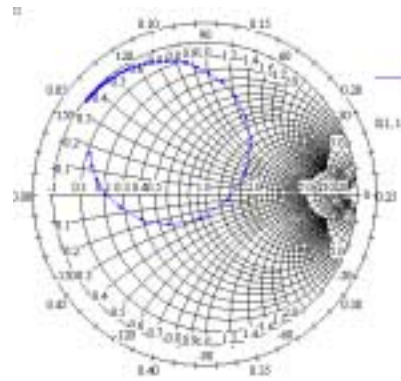
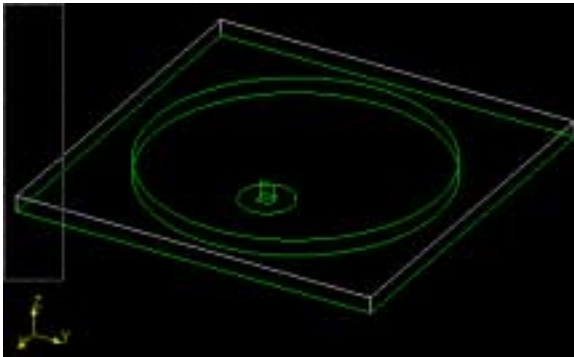
Example Eight: hemispherical dielectric resonator antenna
Large Disk



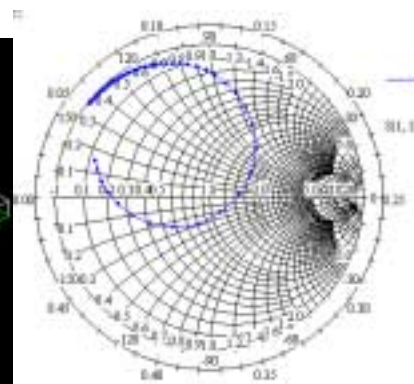
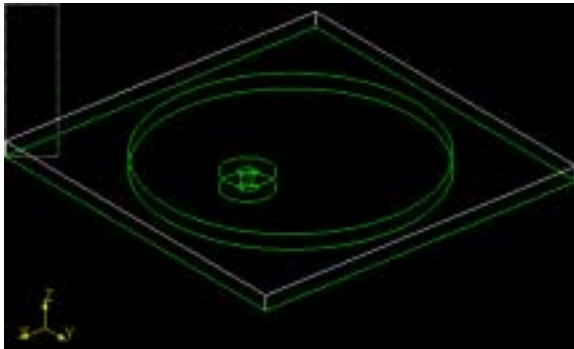
Small Disk



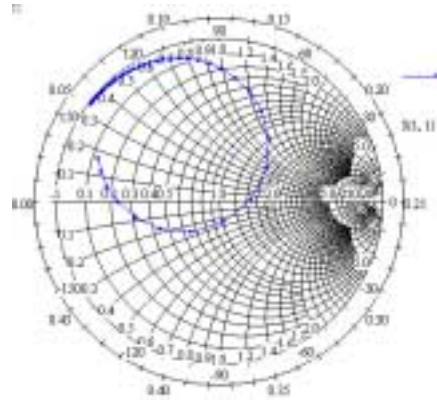
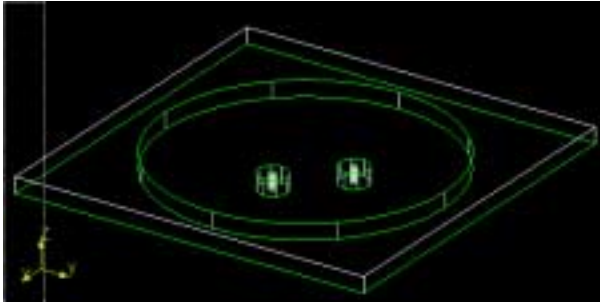
Example Nine: Disk patch antenna.
Ystrip square 50mm



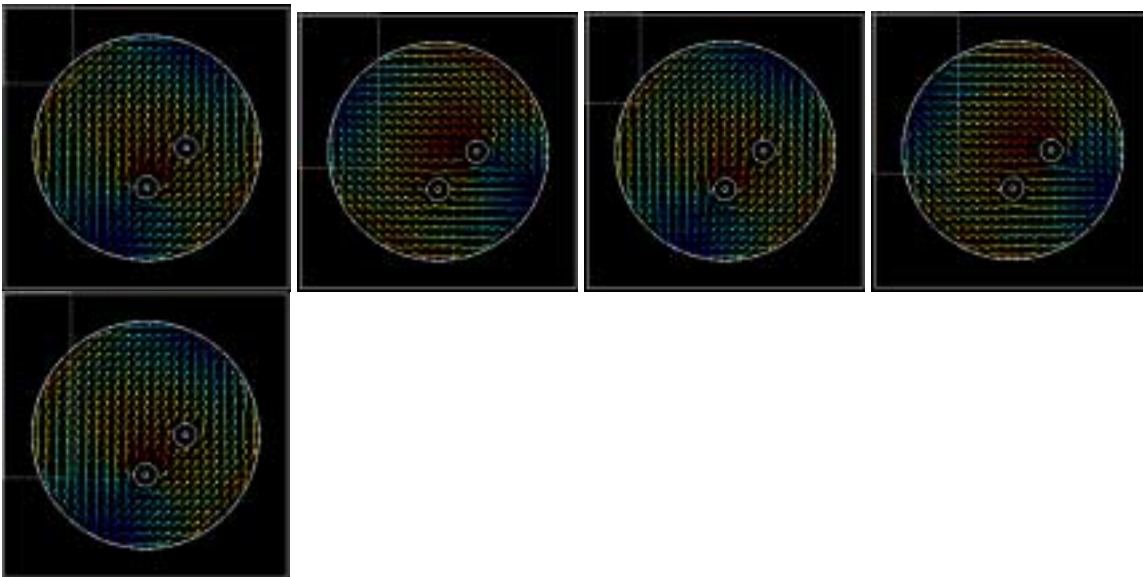
Xstrip square 50mm



Cylinder Fed



Two Wire Fed



time angle= 0

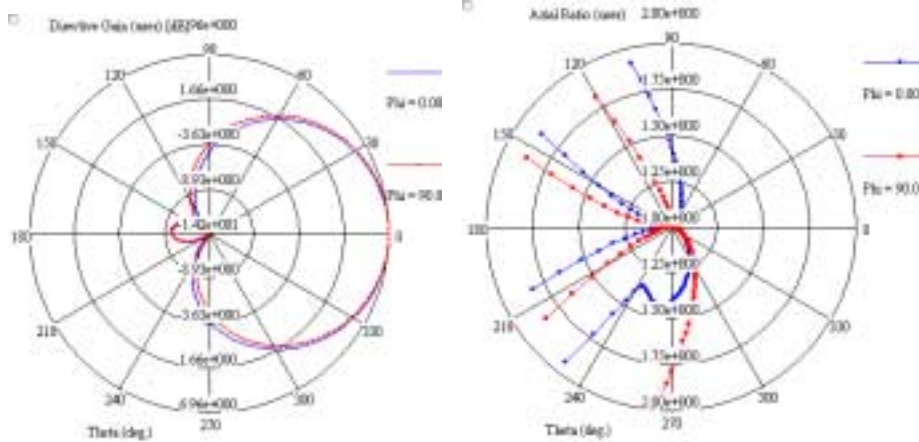
90

180

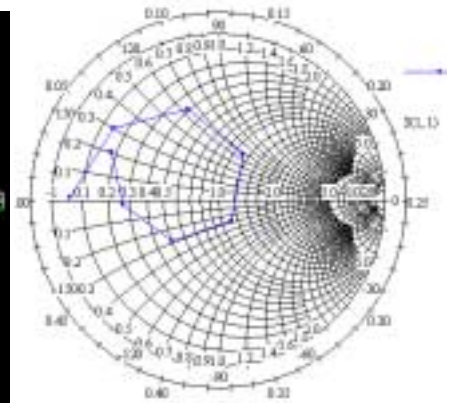
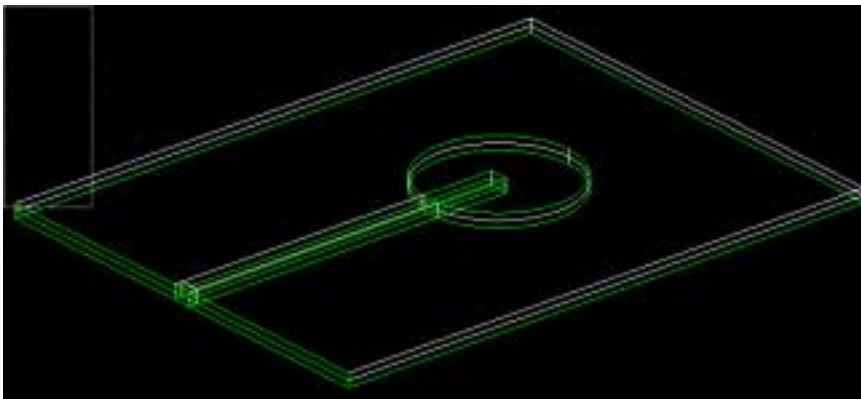
270

360

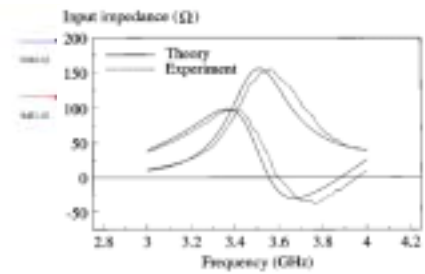
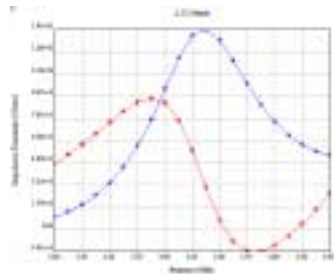
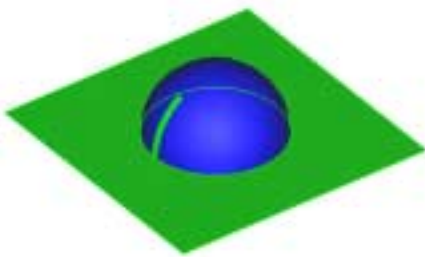
The above figures of the current vectors show that the antenna is circular polarization.



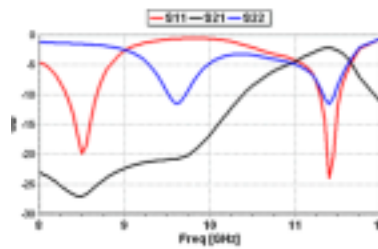
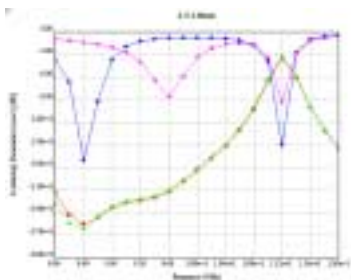
Example Ten: Coupled-fed circular patch antenna



Example Eleven: Conformal strip dielectric resonator antenna

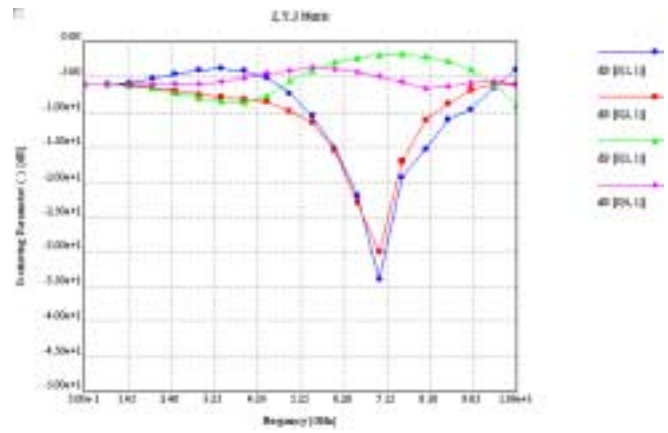
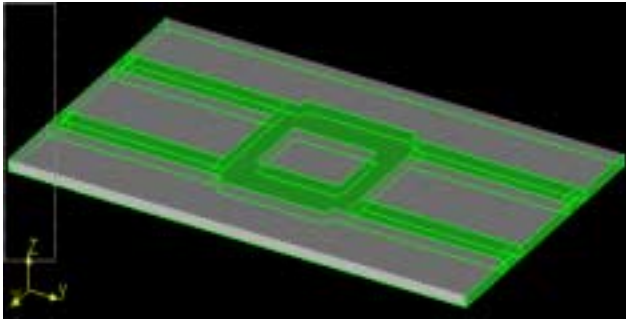


Example Twelve: Two-port asymmetric antenna

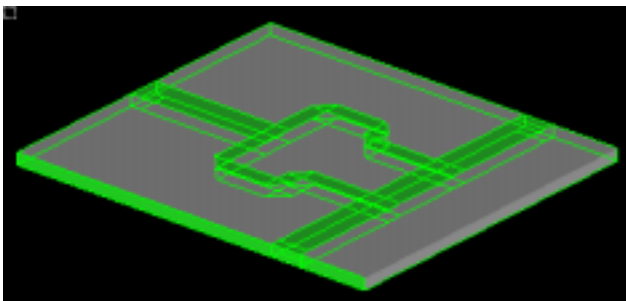


Feko result

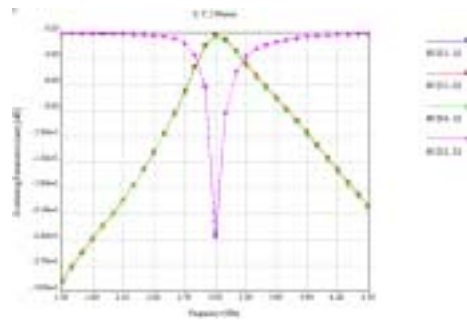
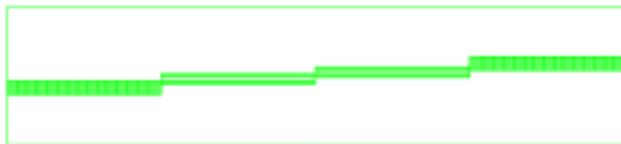
Example Thirteen: Branch line coupler



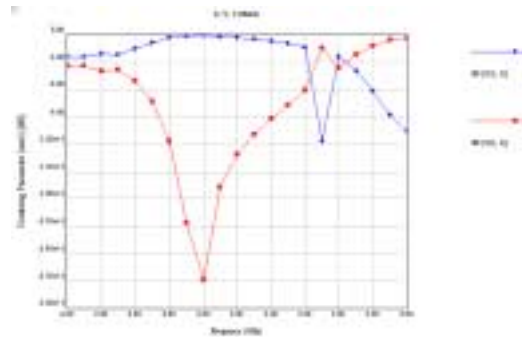
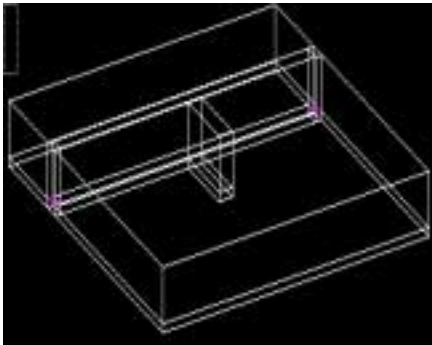
Example Fourteen: Wilkinson power divider



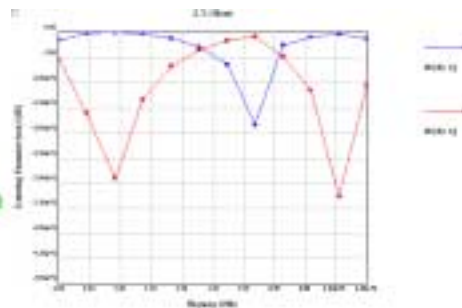
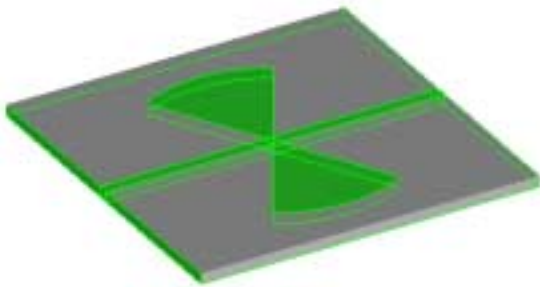
Example Fifteen: Parallel Coupled Line Bandpass Filter



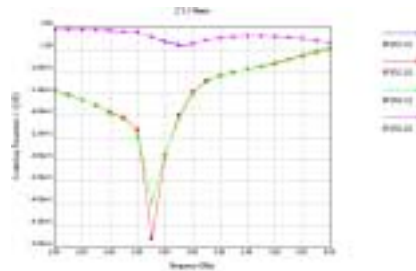
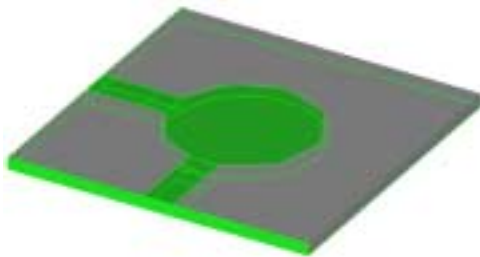
Example Sixteen: Shielded microstrip single-stub filter



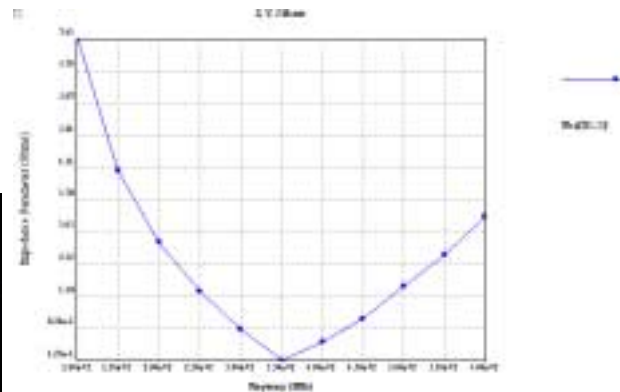
Example Seventeen: Microstrip radial stub



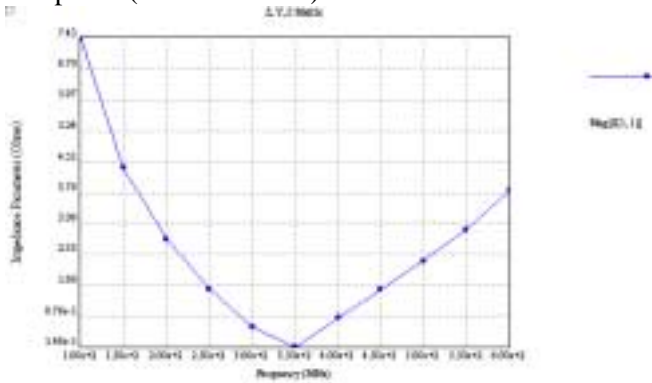
Example Eighteen: Circular Disk Two-port Filter



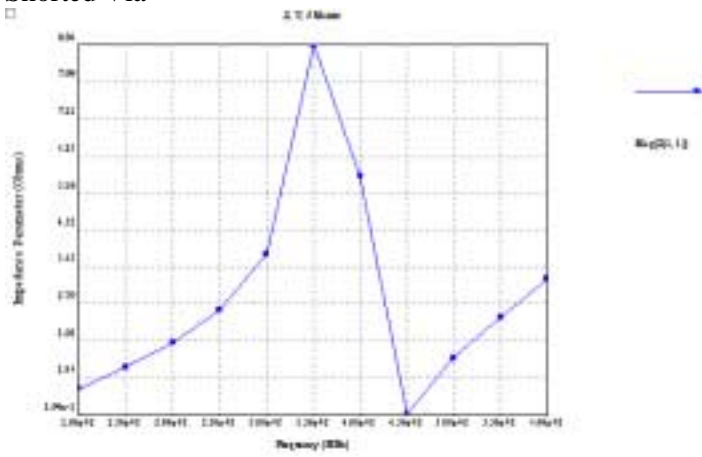
Example Nineteen: Open power bus structures
No Shorted Via



Strip Fed (No shorted via)

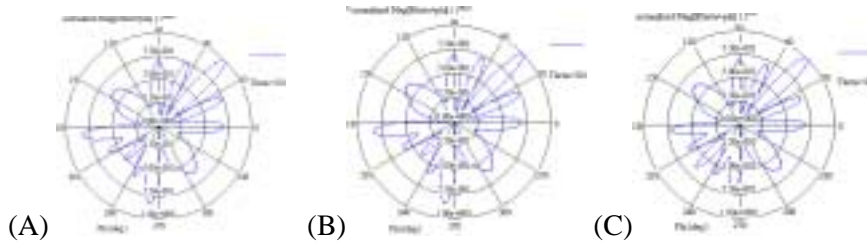


Shorted Via

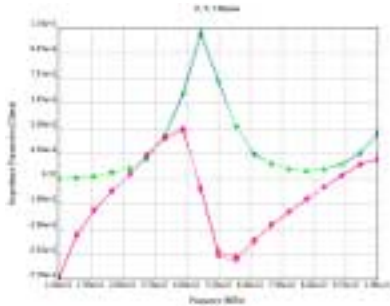


Example Twenty: PO-MoM hybrid method

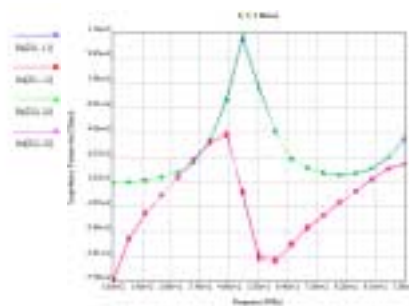
- (A) Two Dipoles With Sphere dielectric vol MoM ($\epsilon_r=4-2j, \mu_r=3-j, d=5\text{mm}$) (accurate model)
- (B) Two Dipoles With Sphere dielectric coated MoM ($\epsilon_r=4-2j, \mu_r=3-j, d=5\text{mm}$)
- (C) Two Dipoles With Sphere dielectric coated AP ($\epsilon_r=4-2j, \mu_r=3-j, d=5\text{mm}$)



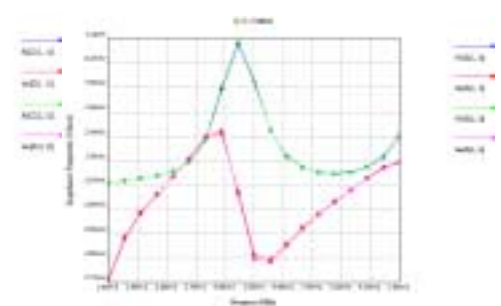
- (A) Two Dipoles With Sphere MoM vol (er=4-2j,ur=3-j, d=5mm) (accurate model)
- (B) Two Dipoles With Sphere MoM coated (er=4-2j,ur=3-j, d=5mm)
- (C) Two Dipoles With Sphere AP coated (er=4-2j,ur=3-j, d=5mm)



(A)

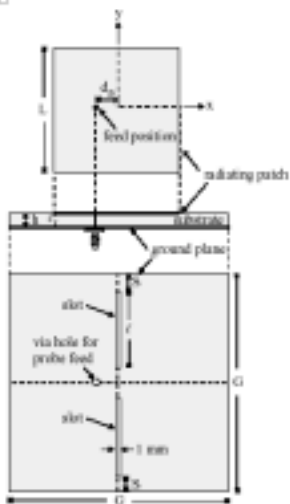


(B)

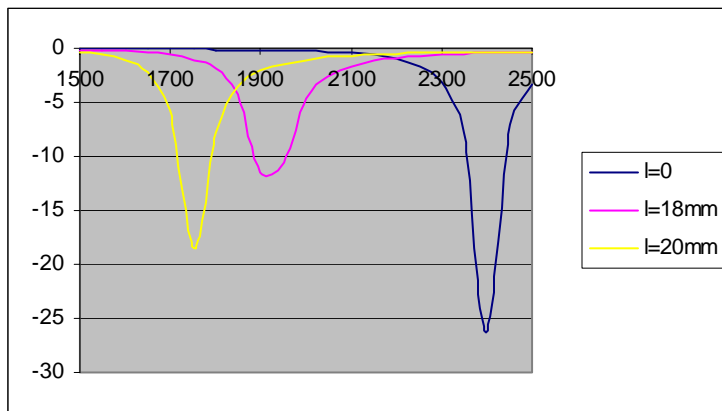


(C)

Example Twenty-one: A compact microstrip antenna with a slotted finite ground plane (<Compact and Broadband Microstrip Antennas>, K.L. Wong, 2002, John Wiley sons, inc.)



- (1) No slot
- (2) Slot 18mm
- (3) Slot 20mm



□

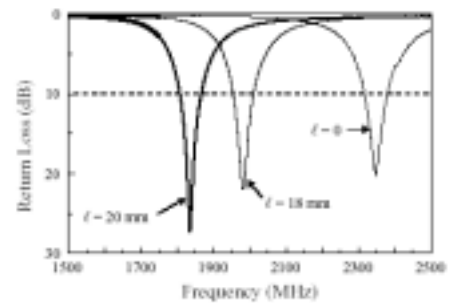
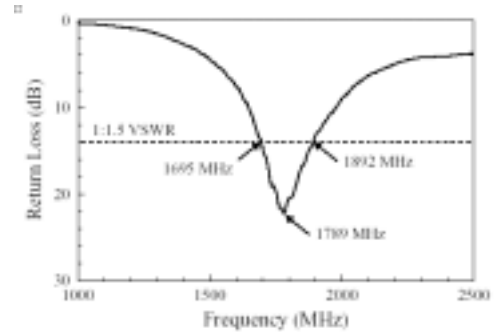
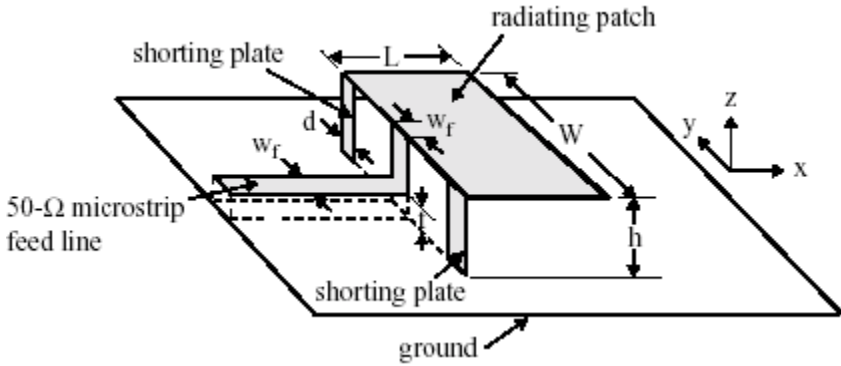


FIGURE 3.48 Measured return loss against frequency for the antenna shown in Figure 3.46. $L = 30$ mm, $G = 50$ mm, $S = 2$ mm, $\epsilon_r = 4.4$, $h = 1.6$ mm, and $d_p = 7$ mm. (From Ref. 23, © 2001 IEEE, reprinted with permission.)

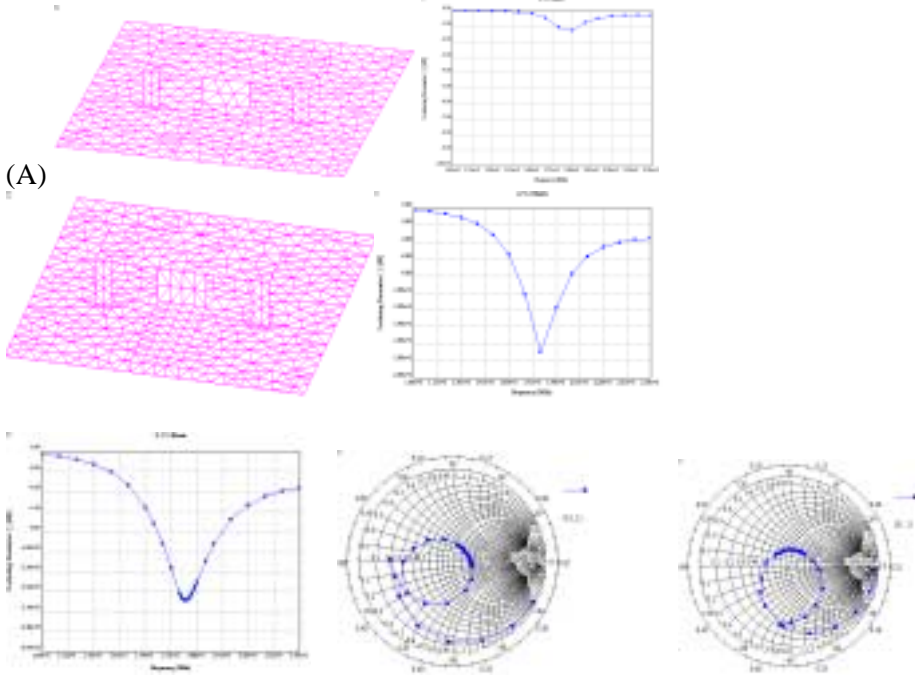
Example Twenty-two: Broadband microstrip-line-fed shorted patch antenna: (<Compact and Broadband Microstrip Antennas>, K.L. Wong, 2002, John Wiley sons, inc.)

This antenna can be used for the base-station application in DCS cellular communication system.

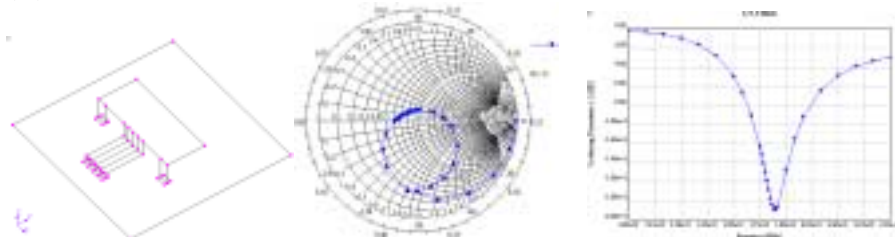
□



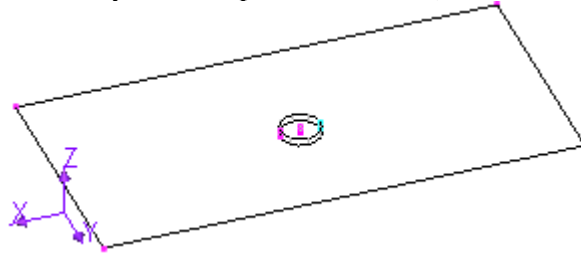
- (A) Microstrip Line Fed Shorted Patch
- (B) Microstrip Line Fed Shorted Patch Model A
- (C) Microstrip Line Fed Shorted Patch Model A after de-embedding 15mm length



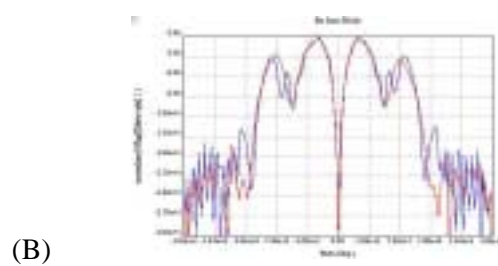
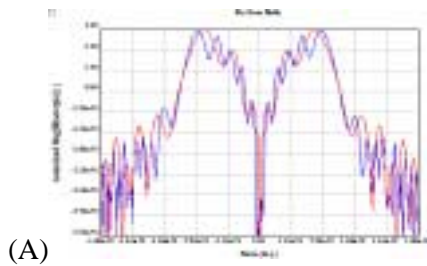
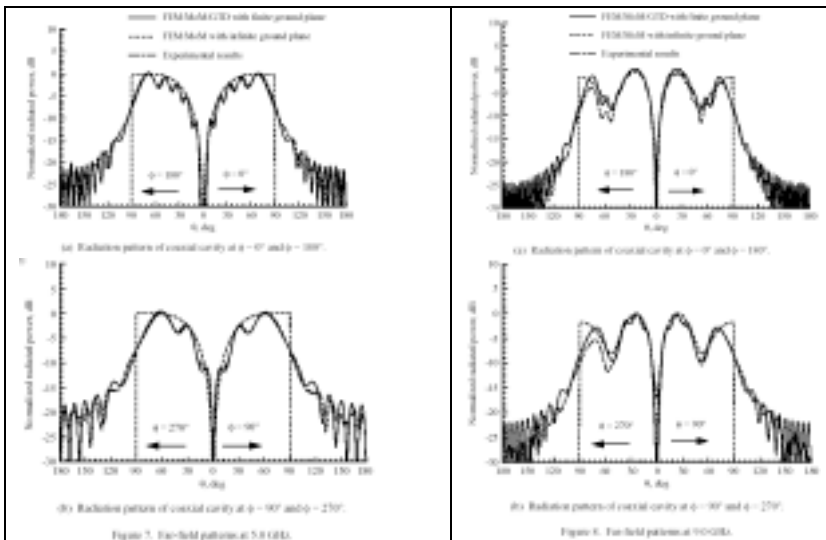
- (D) Model A Feed Moved



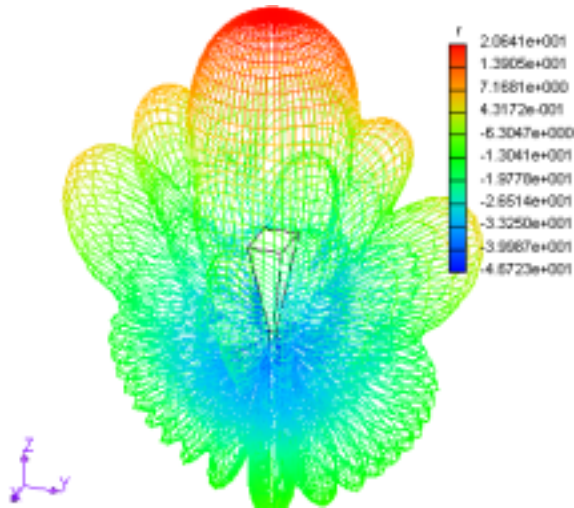
Example Twenty-three: Cavity-backed aperture antenna (From NASA Technical Paper 3548,nov.1995)



Geometrical model
(A) Finite Gnd rad 5GHz
(B) Finite Gnd rad 9GHz

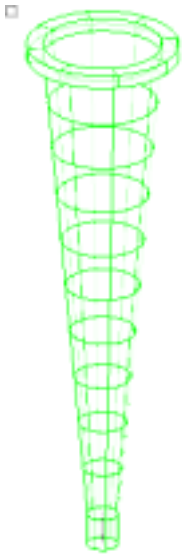


Example Twenty-four: Pyramidal horn antenna

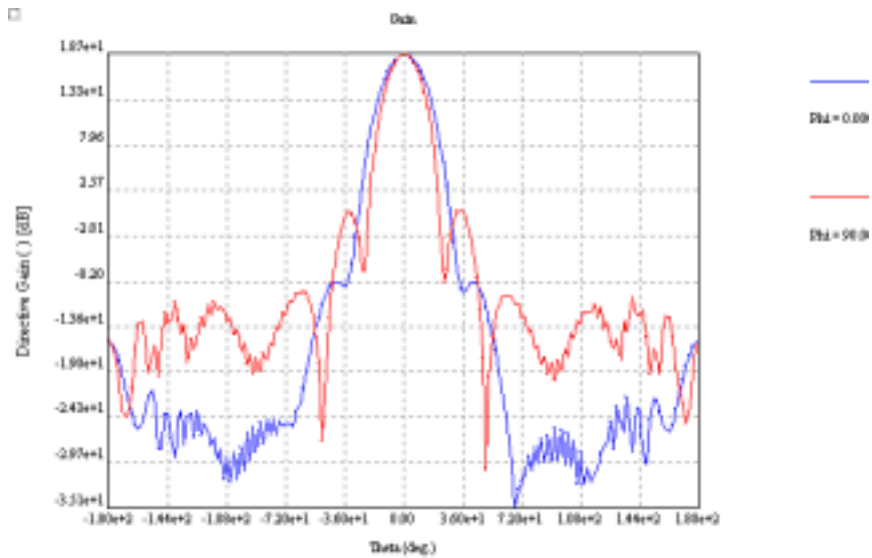


The gain 3D pattern

Example Twenty-five: Conical horn antenna



Geometrical model



Directive gain pattern