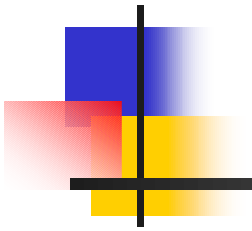

Investigation of a Curtain Antenna Array for TIGER

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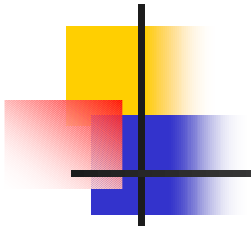
Electronics Engineering Dept

La Trobe University

Australia

Problems of currently used antennas

- Structural problem
    1. Broken long elements (wind 47 m/s)
    2. Tower bent along wind direction
    3. Twisted of horizontal boom
- Questioning of antenna performance



Objectives

- Modification of the Log periodic antenna to achieve a robust structural that requires minimal maintenance.

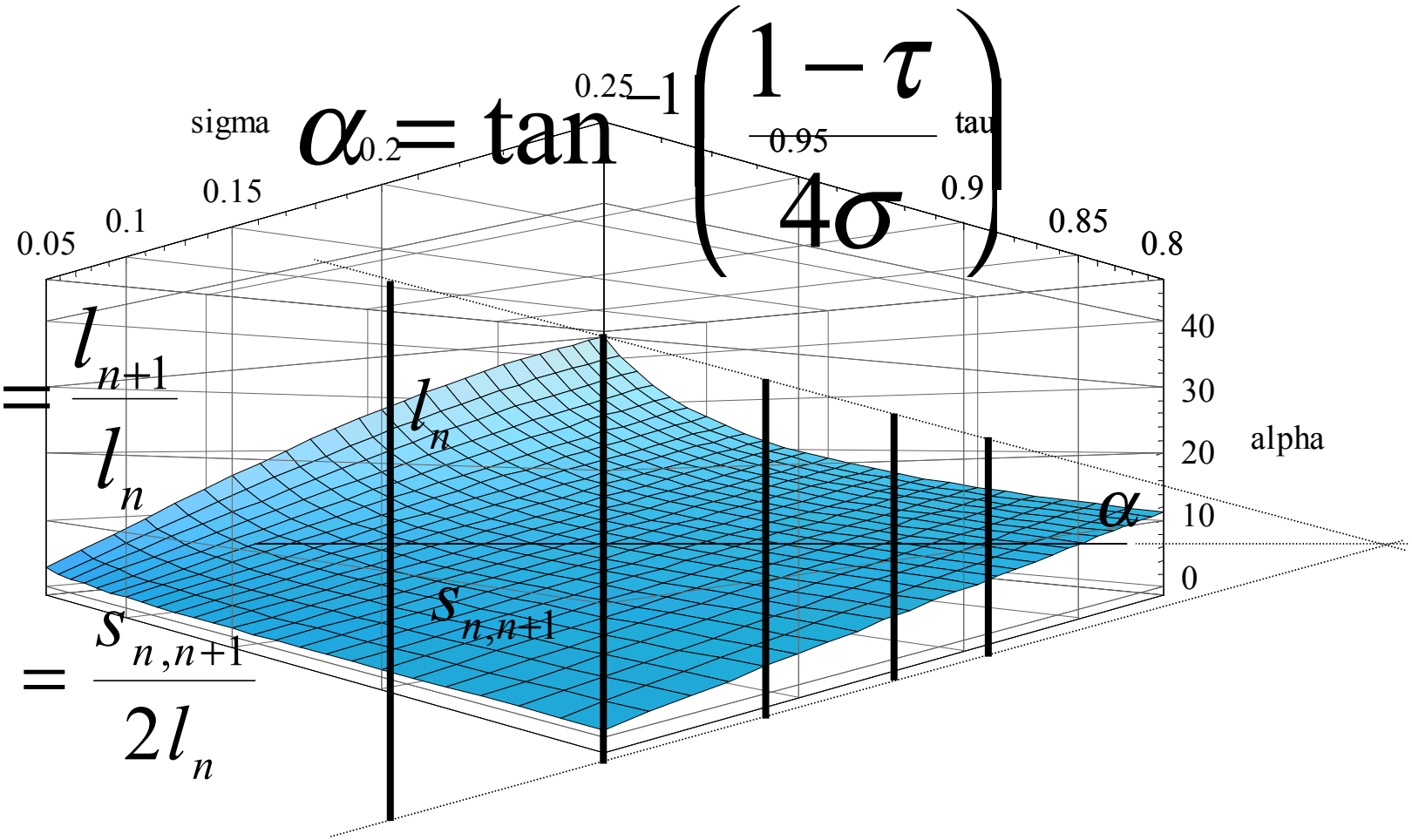
- Implementation of frequency independent array to ensure a broadband operation.

Possibility of compact LPDA

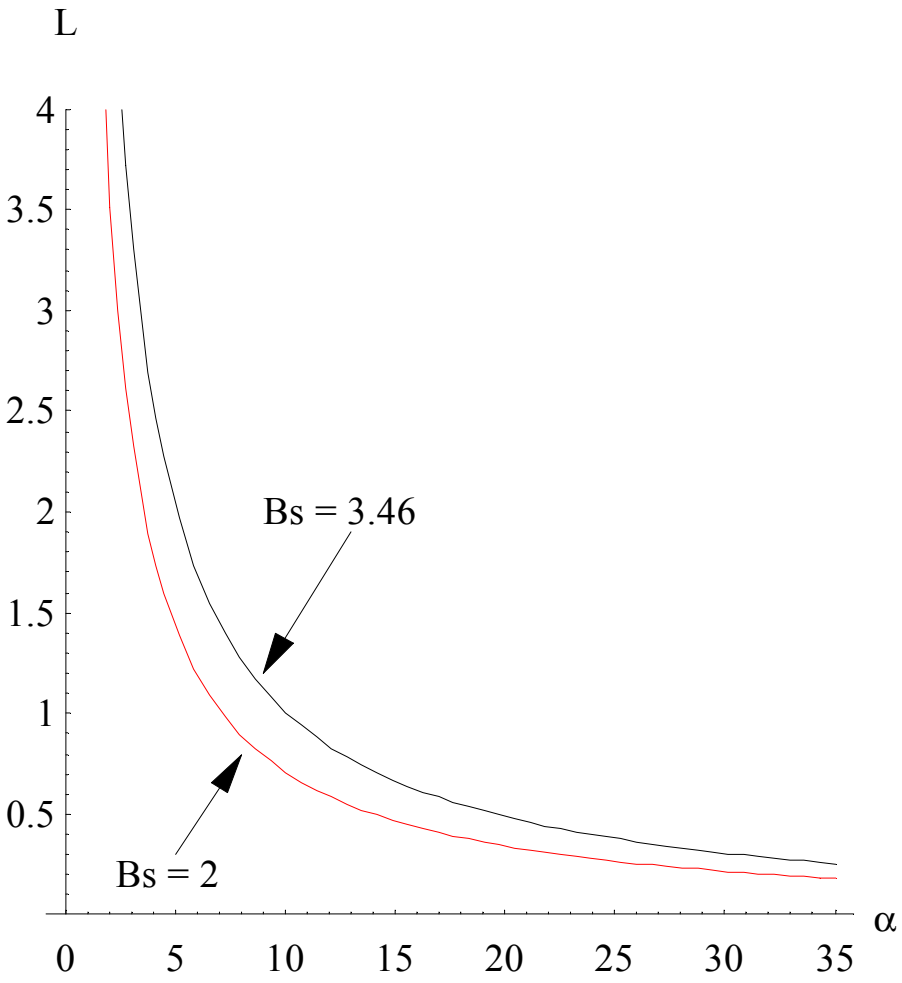
$$\alpha_{0.2} = \tan^{-1}\left(\frac{1-\tau}{4\sigma}\right)$$

$$\tau = \frac{l_{n+1}}{l_n}$$

$$\sigma = \frac{s_{n,n+1}}{2l_n}$$



L/Alpha/Bs relationship

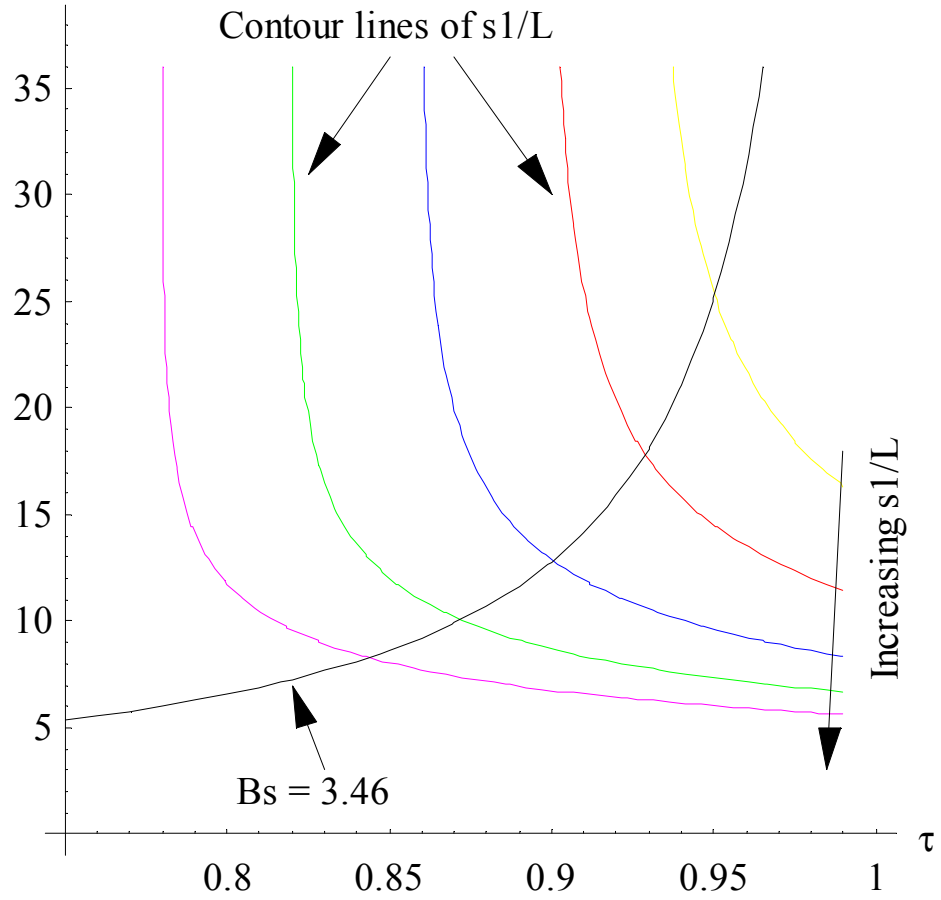


A Different Approach

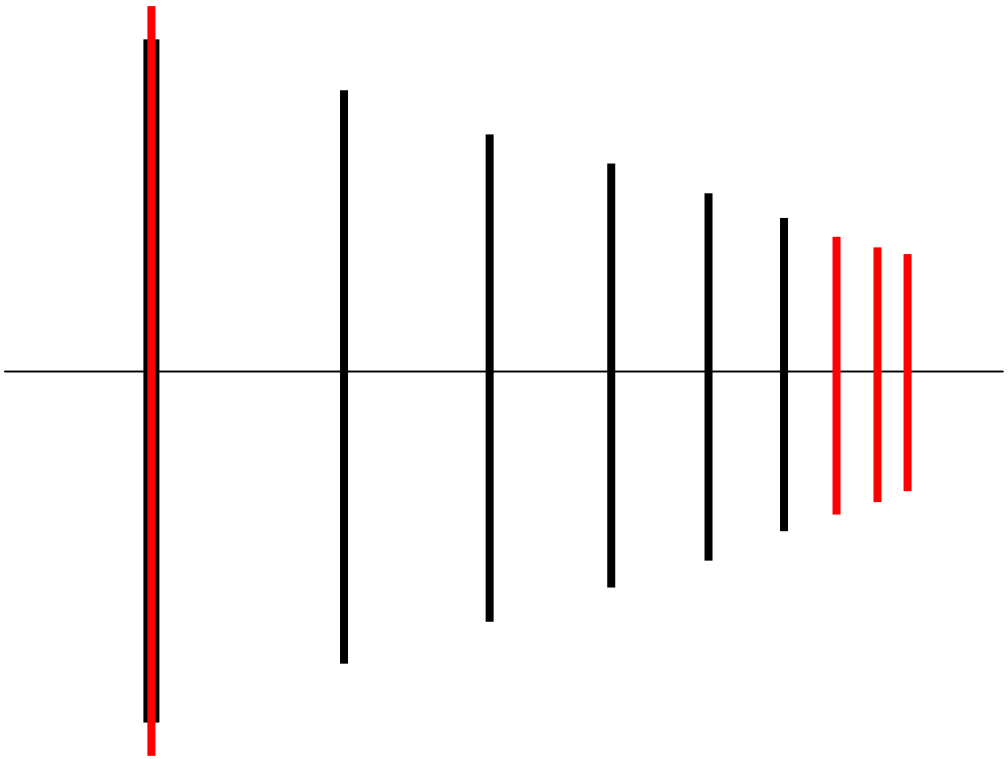
$$\frac{s_{1,2}}{L} = \frac{1-\tau}{1-\tau^{N-1}}$$

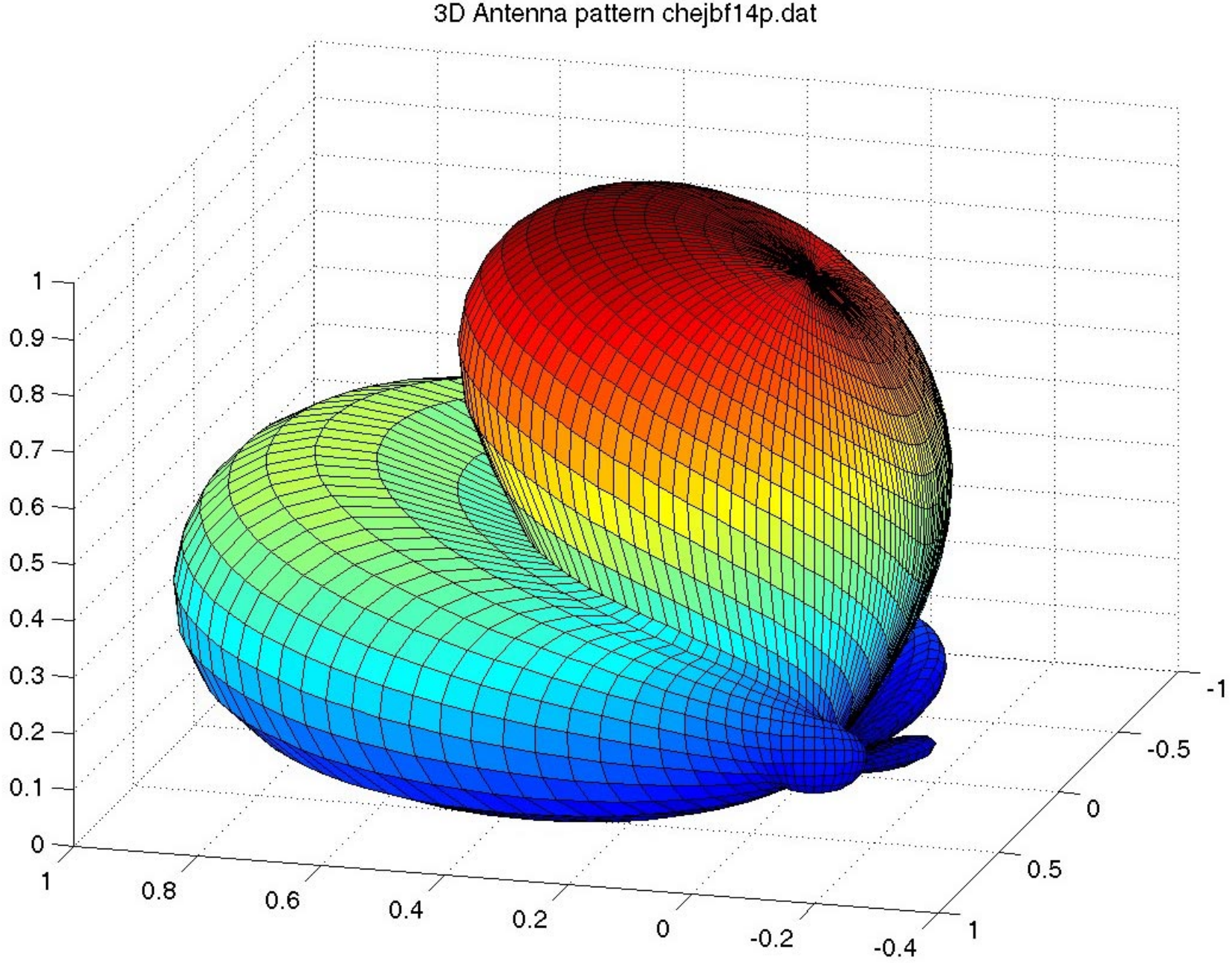
Bs/Tau/N/S_1/L relationship

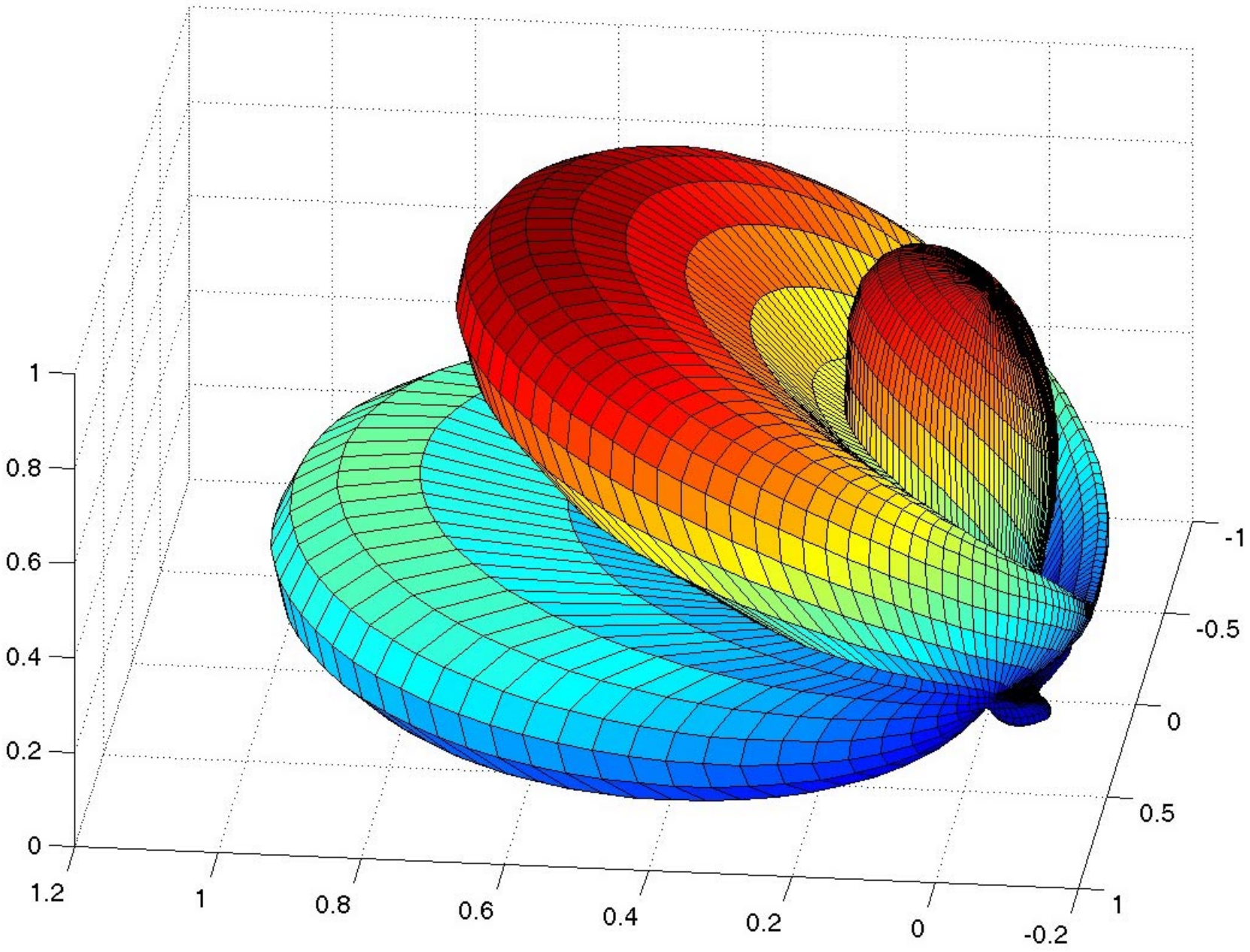
n

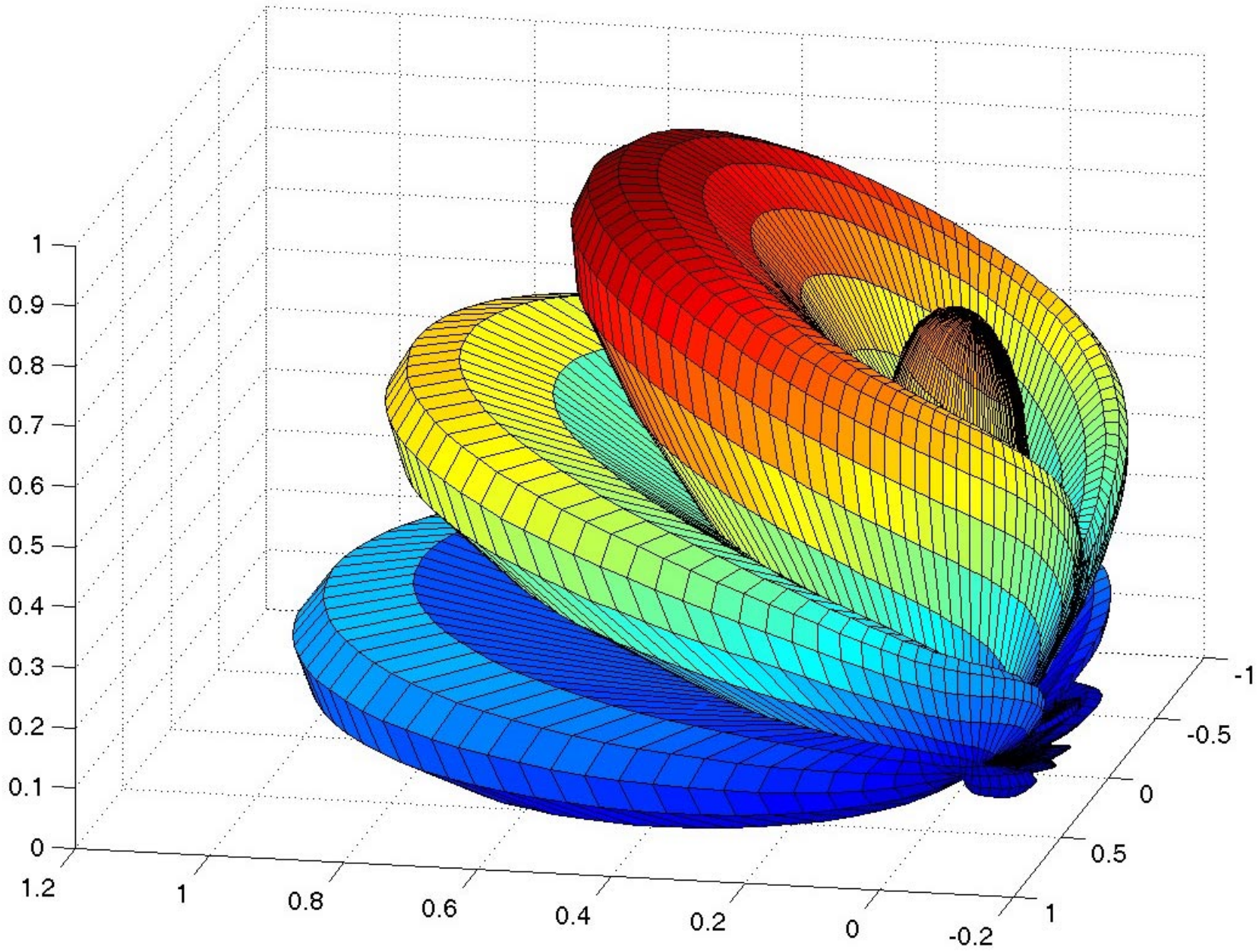


Broaden Structure Bandwidth

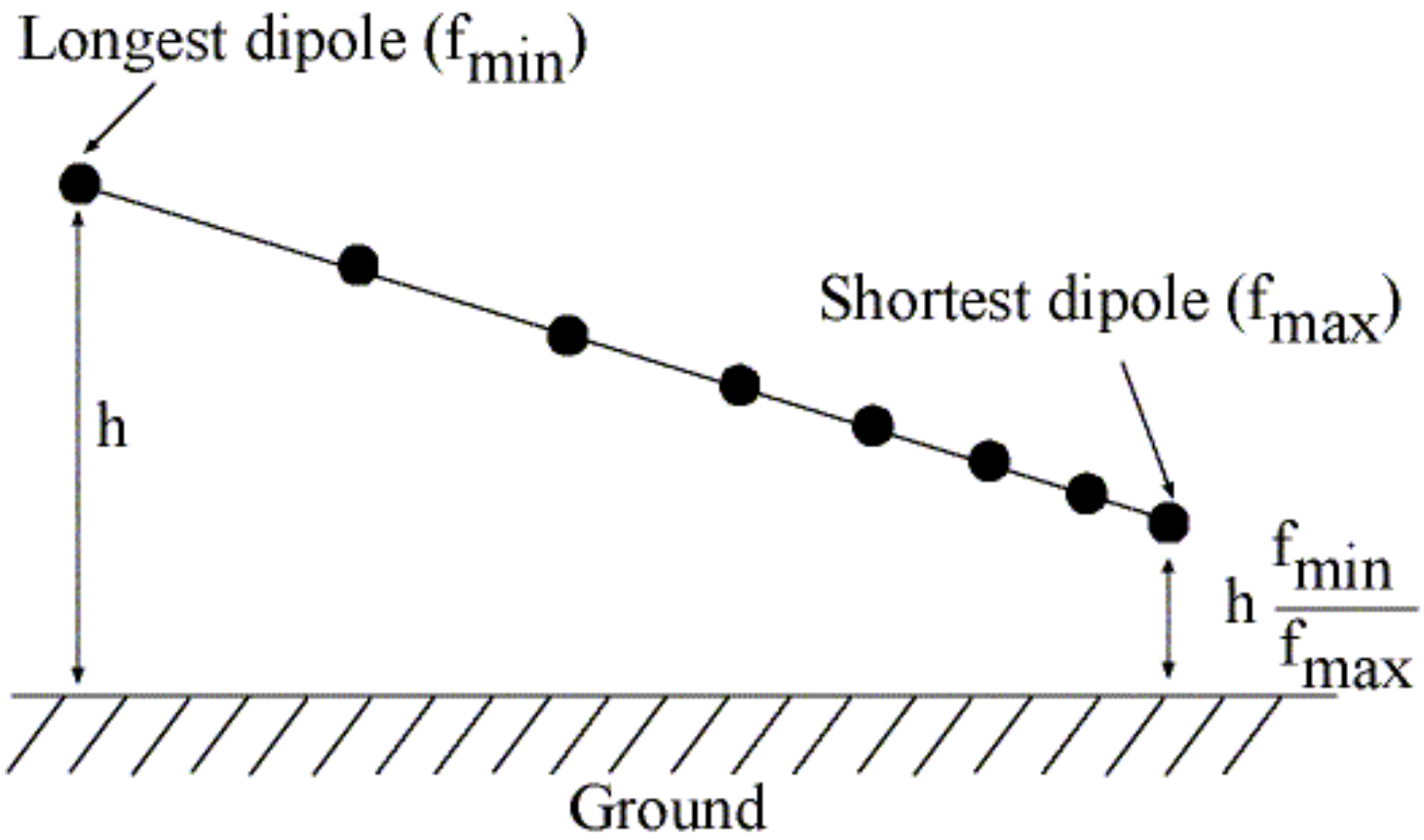



3D Antenna pattern chejbf14p.dat
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
1
0.5
0
-0.5
-1

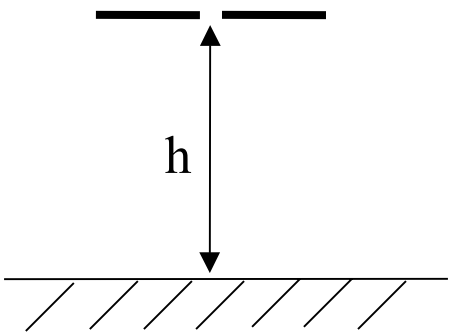

3D Antenna pattern chejbf20p.dat
1
0.8
0.6
0.4
0.2
0
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
1
0.5
0
-0.5
-1

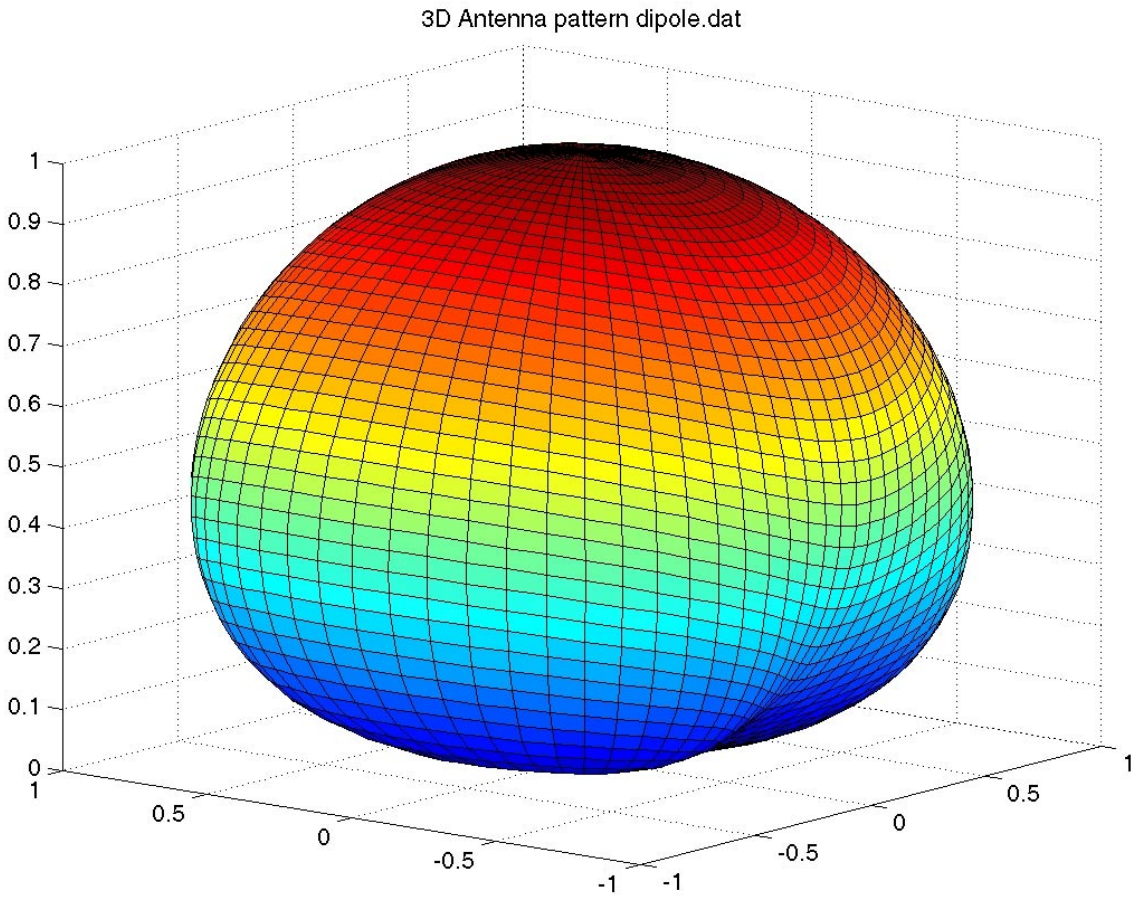

3D Antenna pattern chejbf28p.dat
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
1
0.5
0
-0.5
-1

Control of electrical height

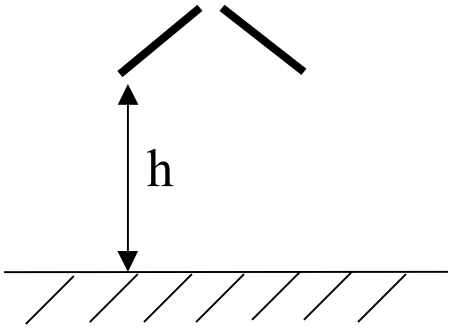


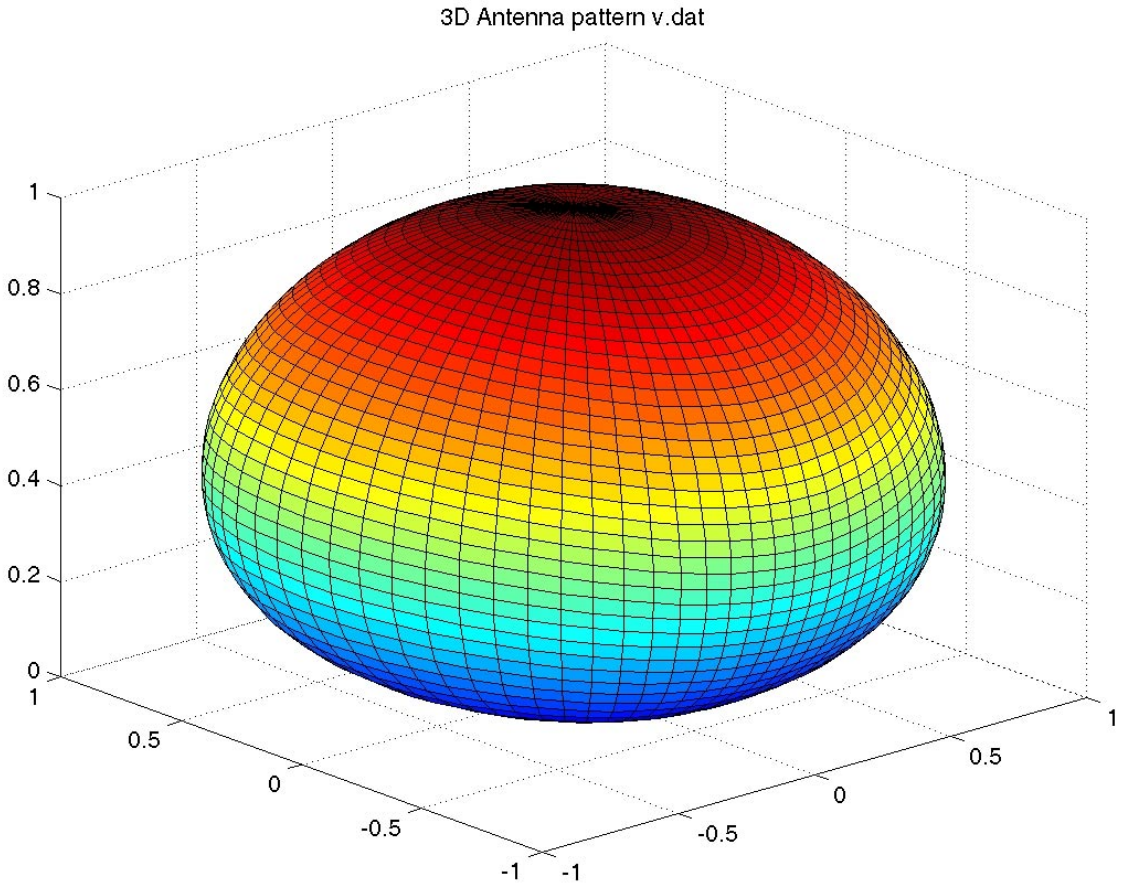
Dipole over ground



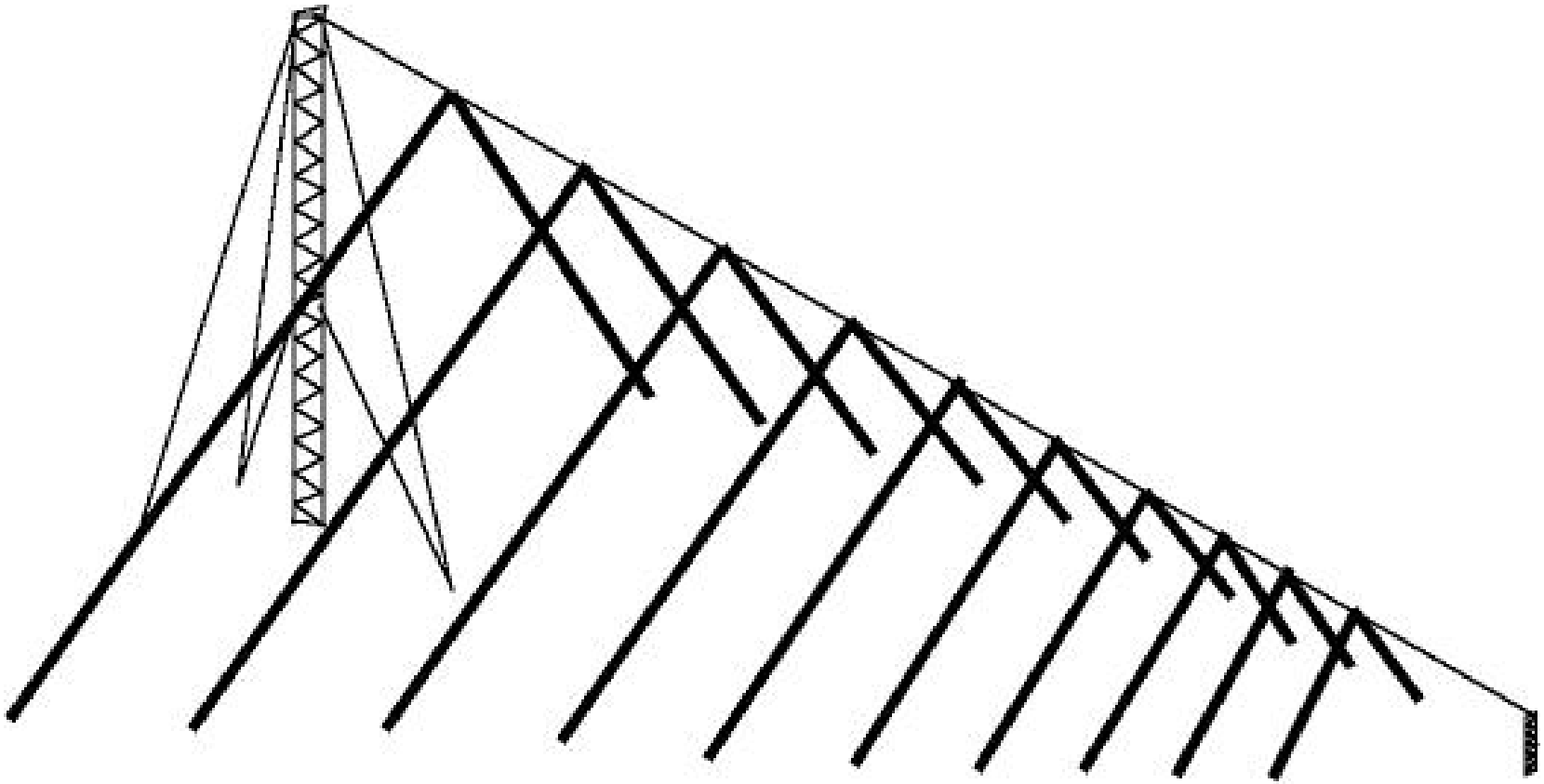


Inverted-V dipole over ground

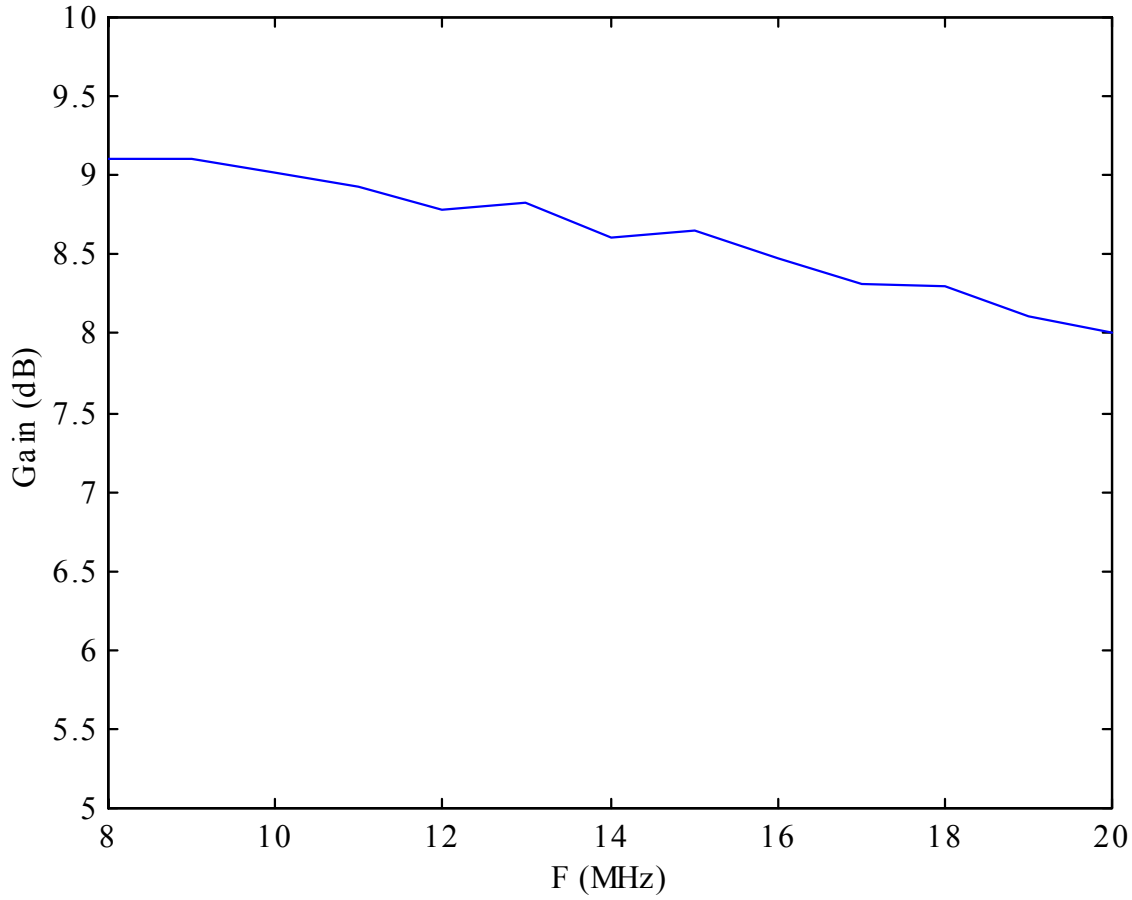




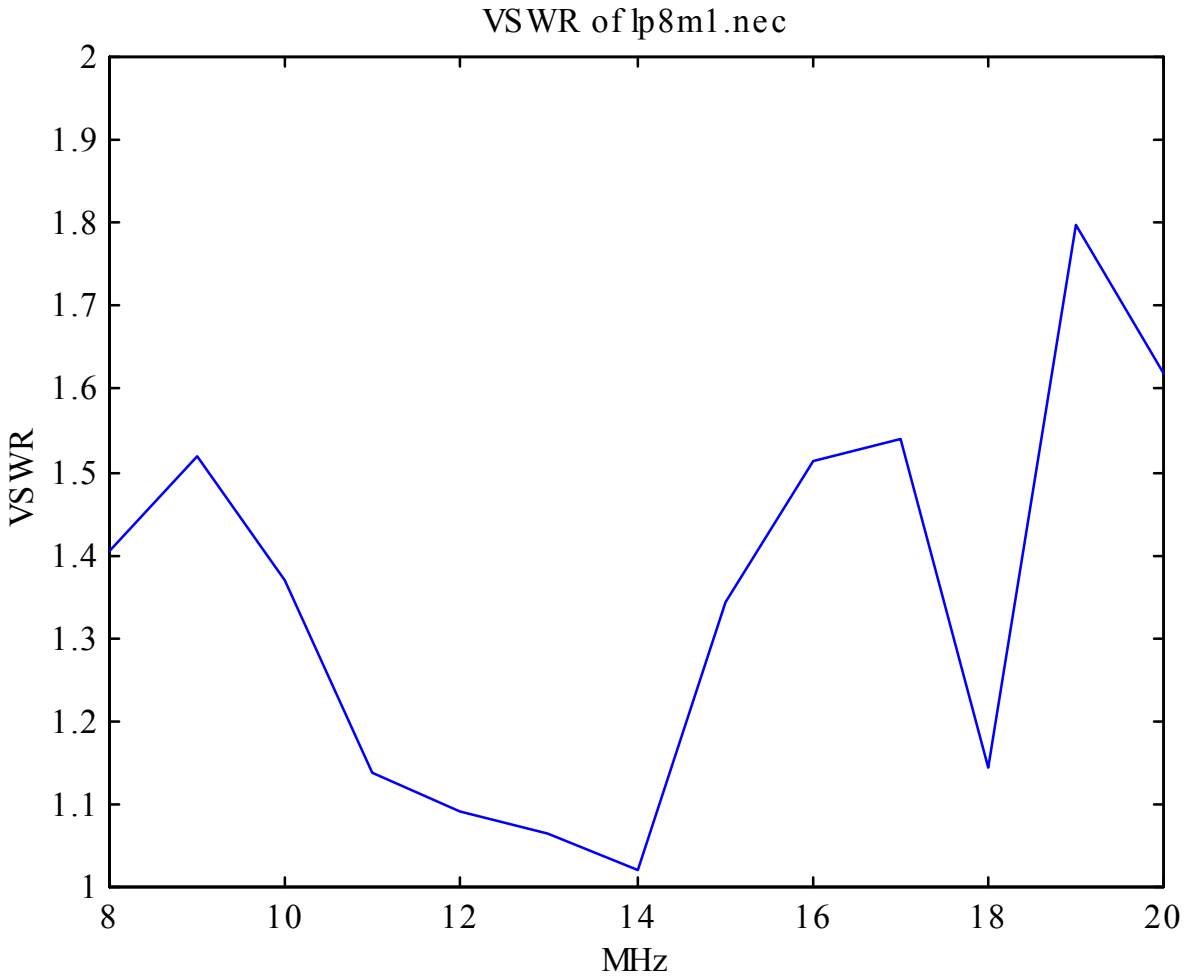
New LPDA Structure

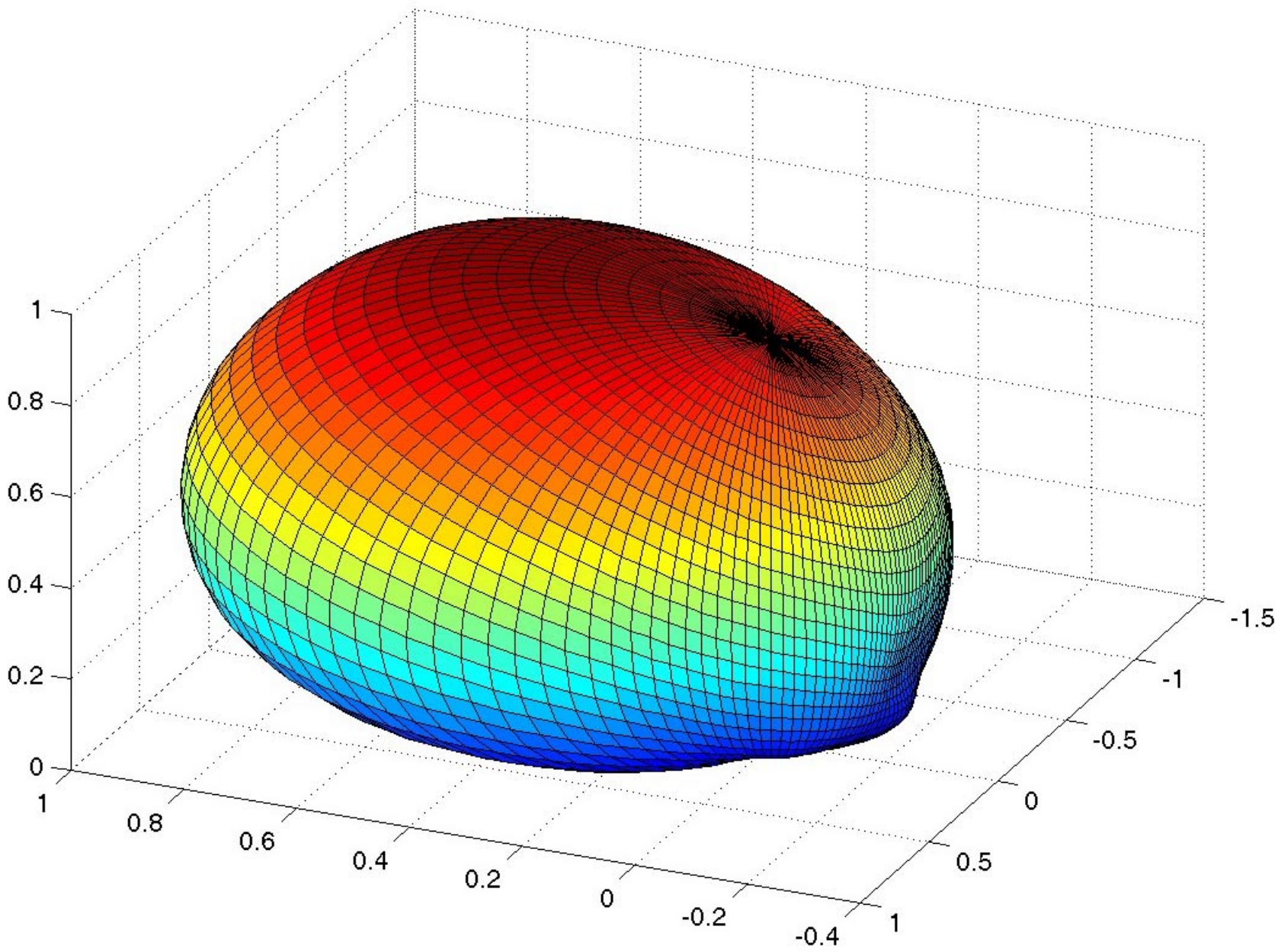


Gain over 8-20 MHz band

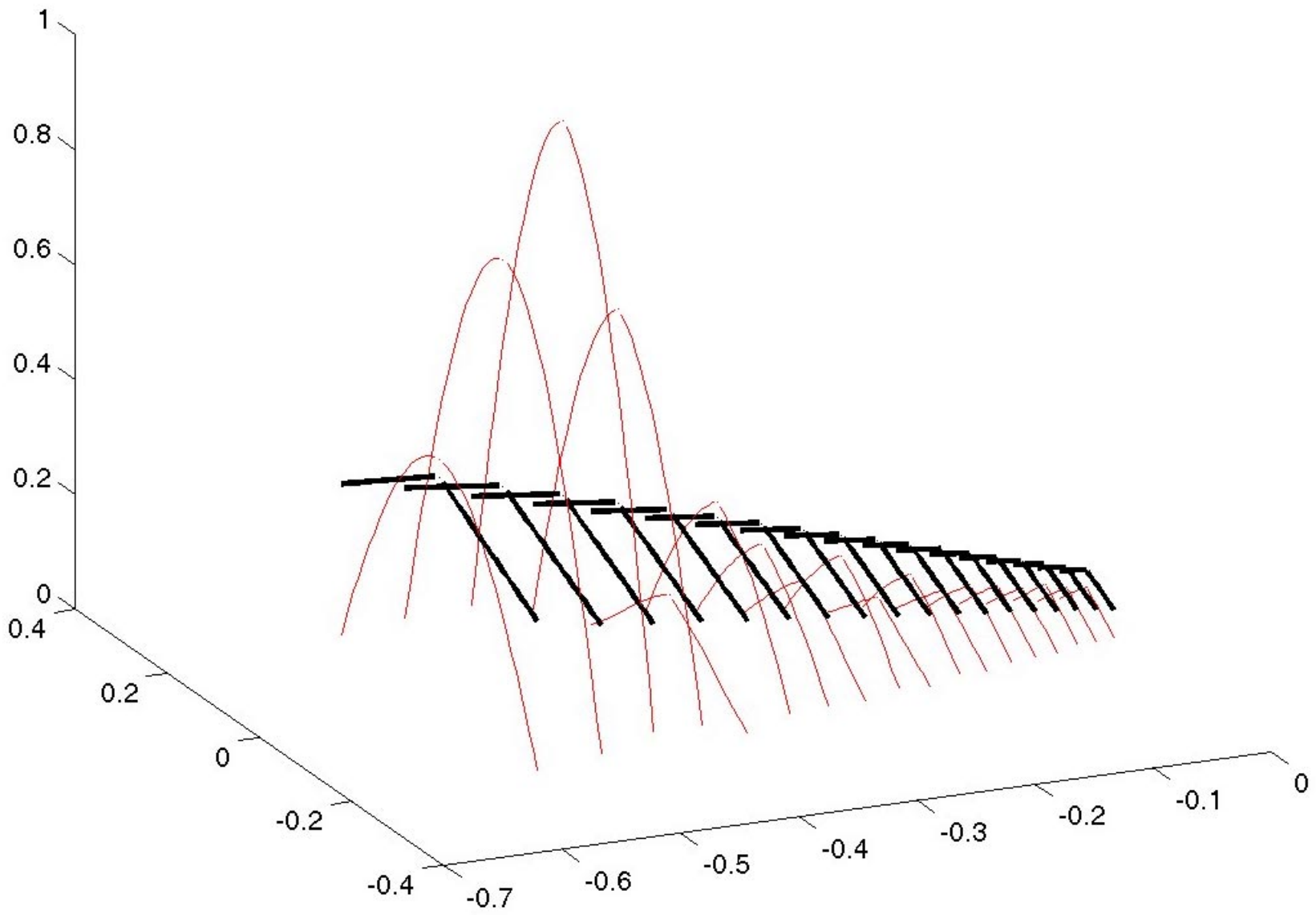


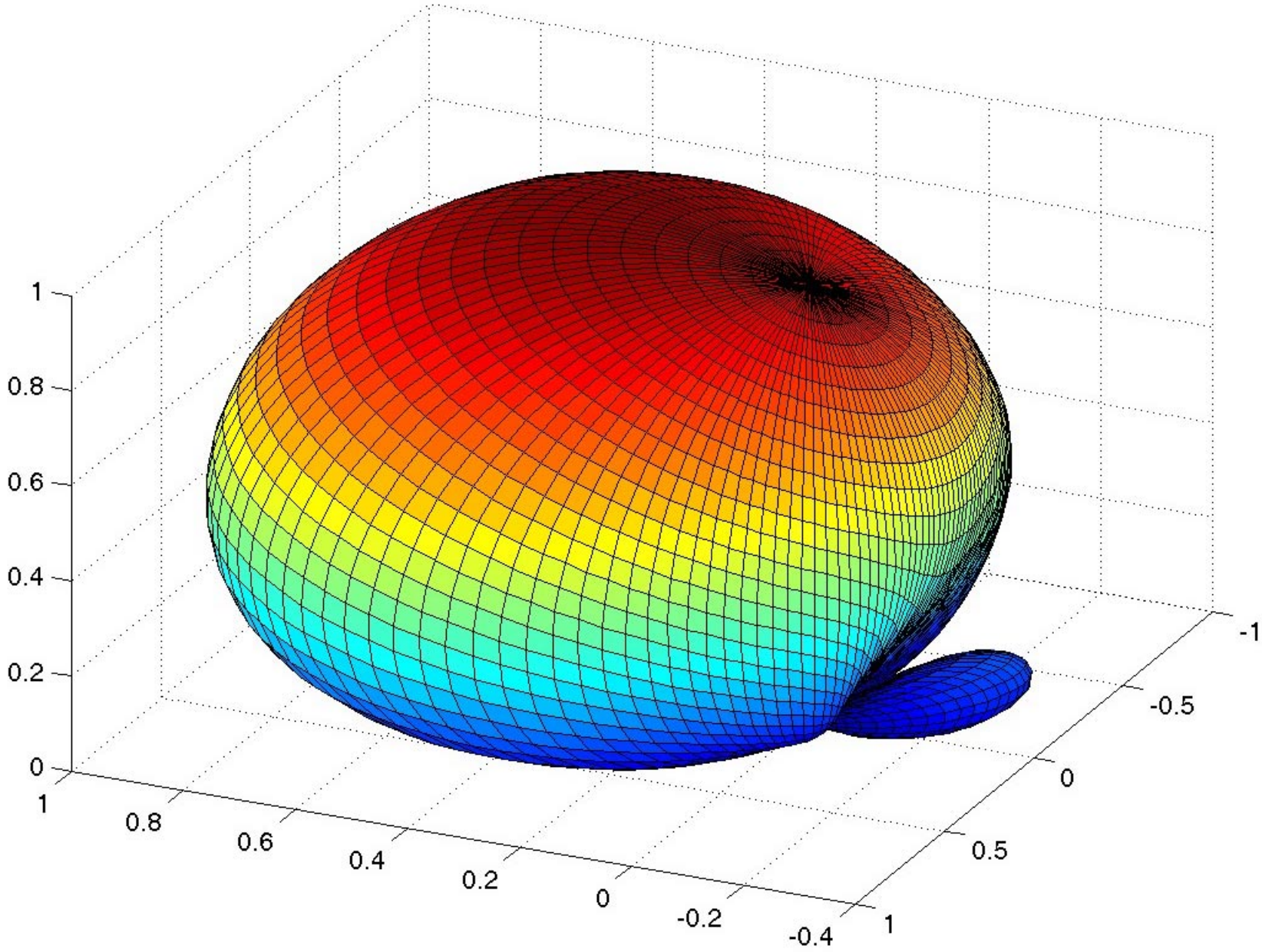
Smith Chart and VSWR



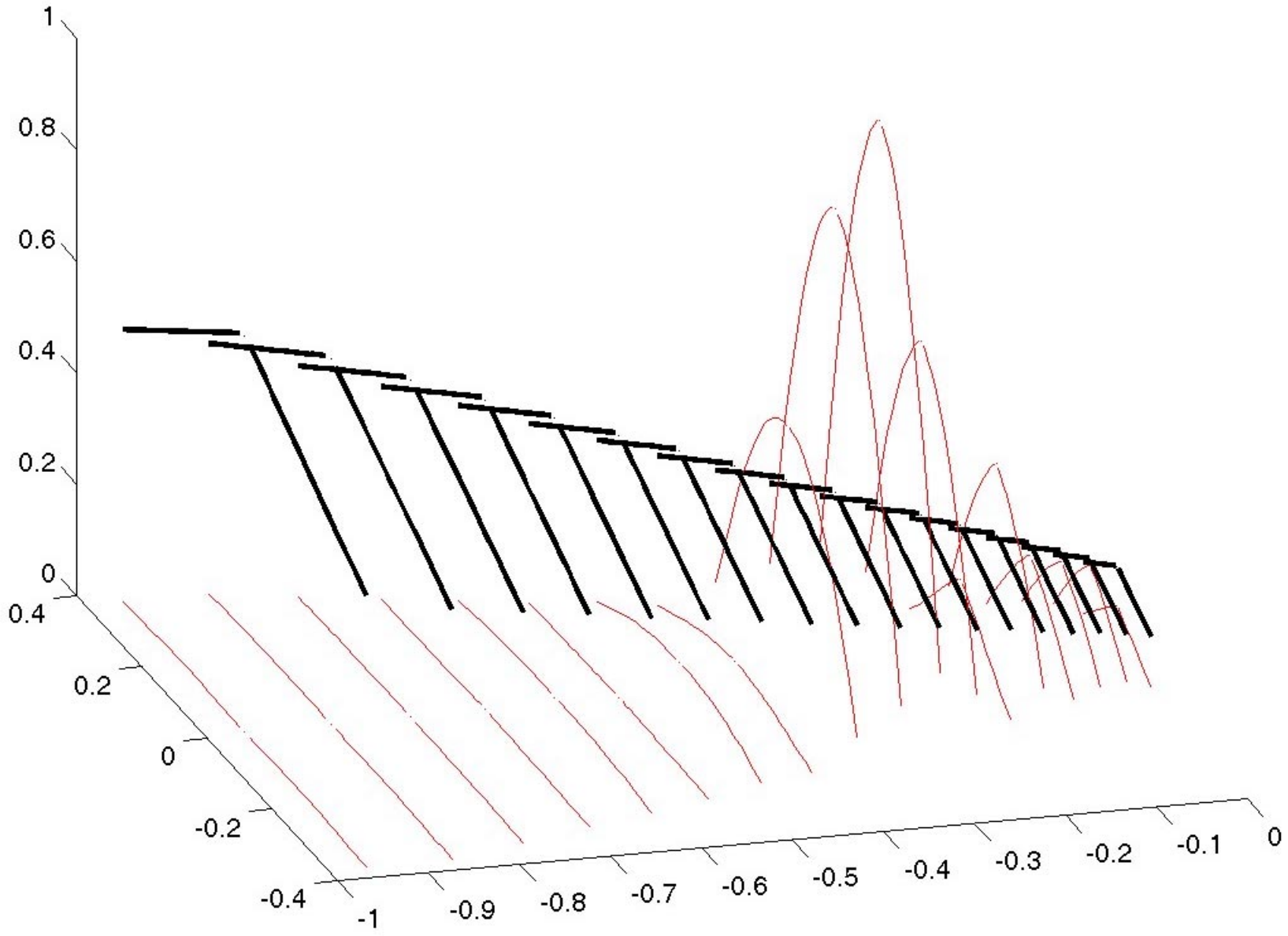

3D Antenna pattern lp8m1f8p.dat
1
0.8
0.6
0.4
0.2
0
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
1
0.5
0
-0.5
-1
-1.5

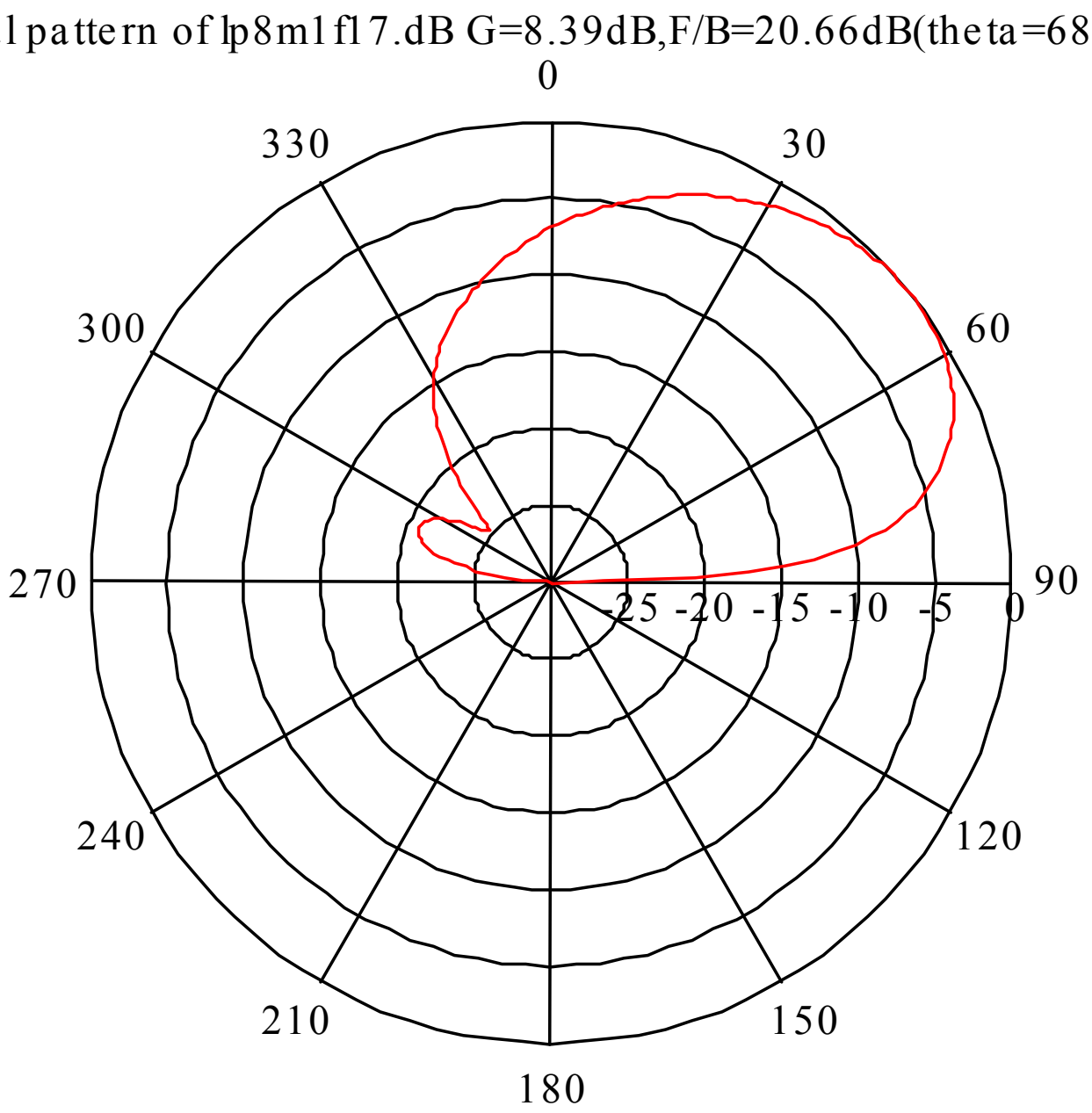
Lp8m1f8c.dat



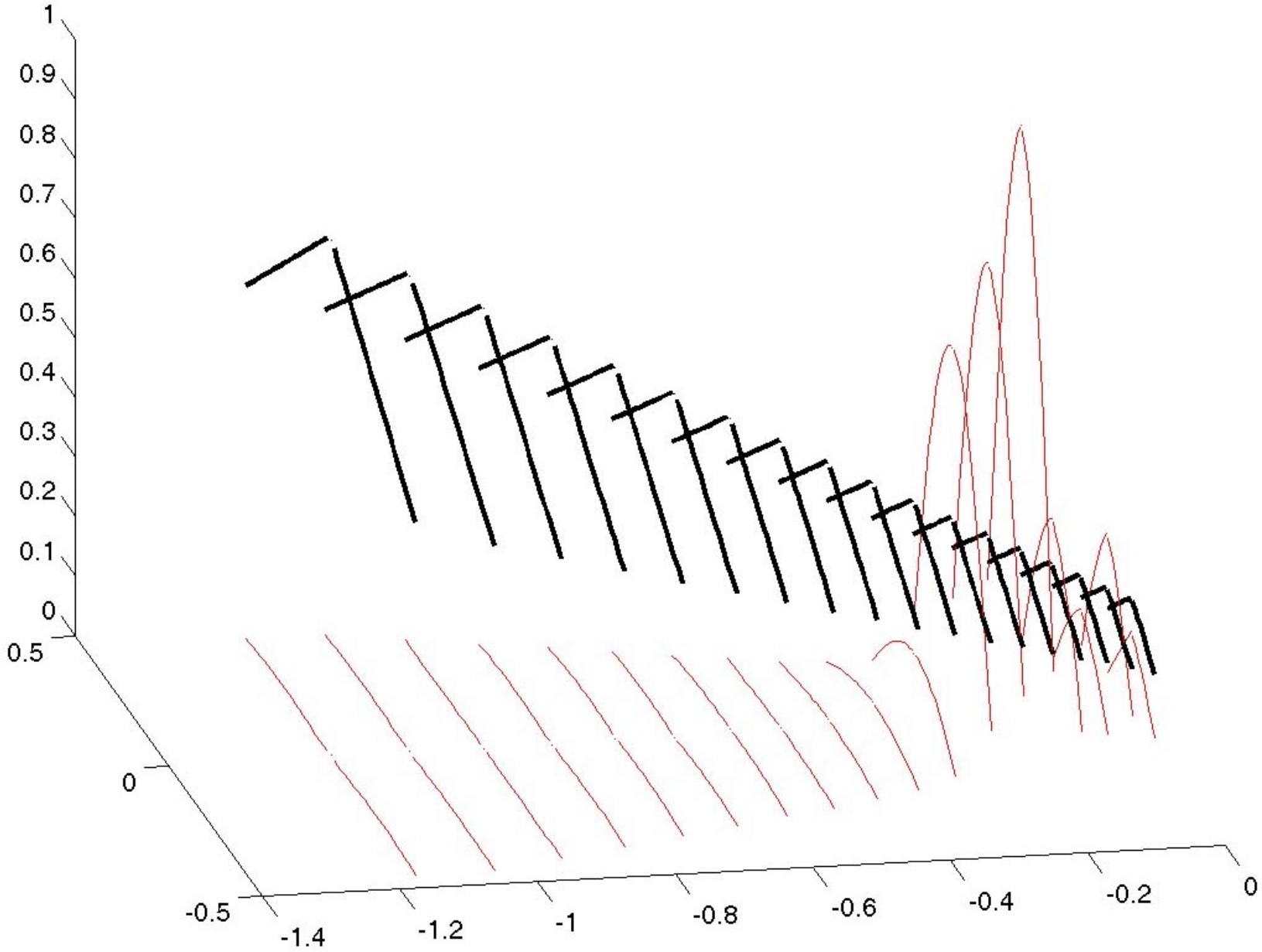

3D Antenna pattern lp8m1f14p.dat
1
0.8
0.6
0.4
0.2
0
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
1
0.5
0
-0.5
-1

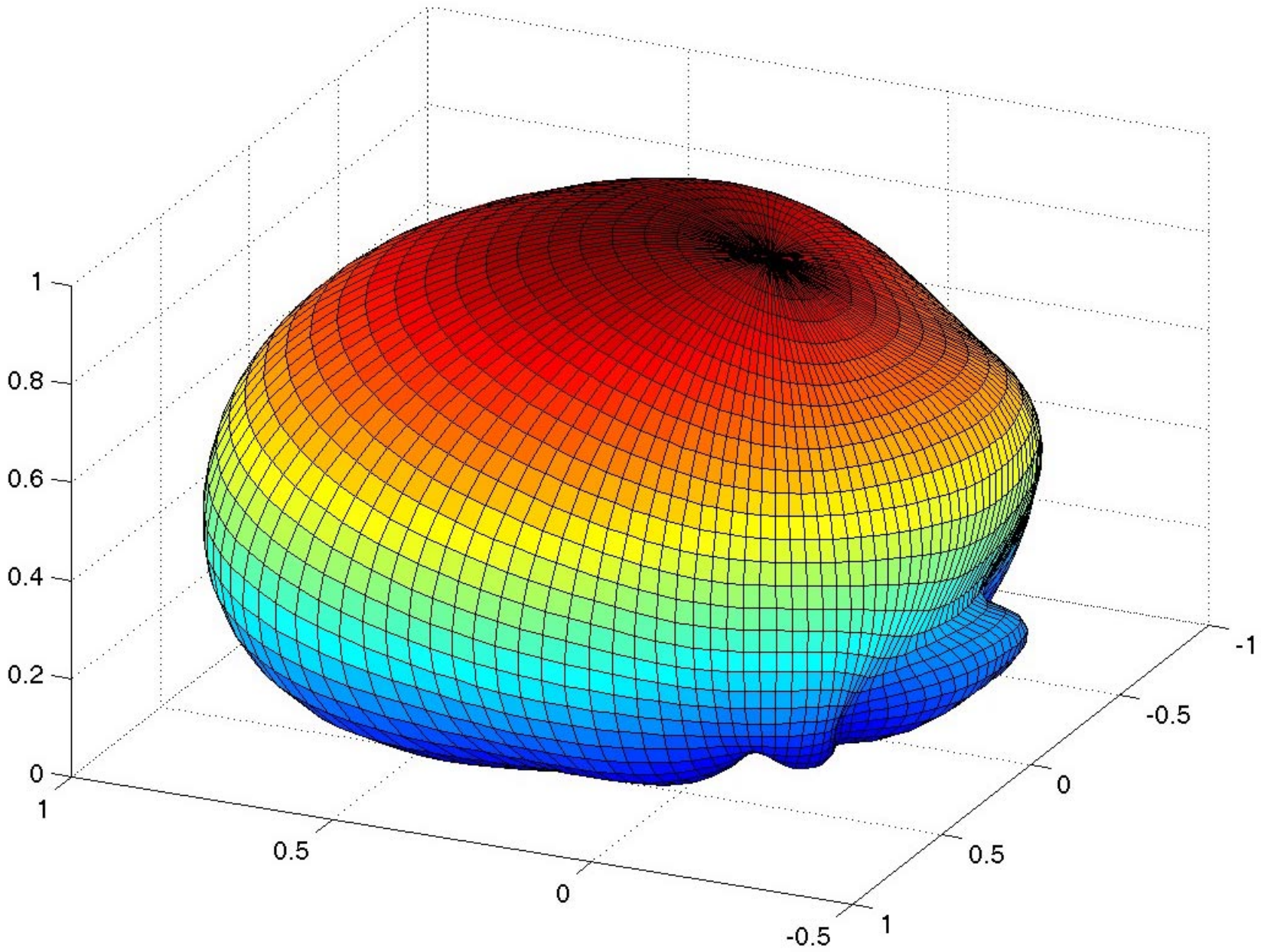
Lp8m1f14c.dat



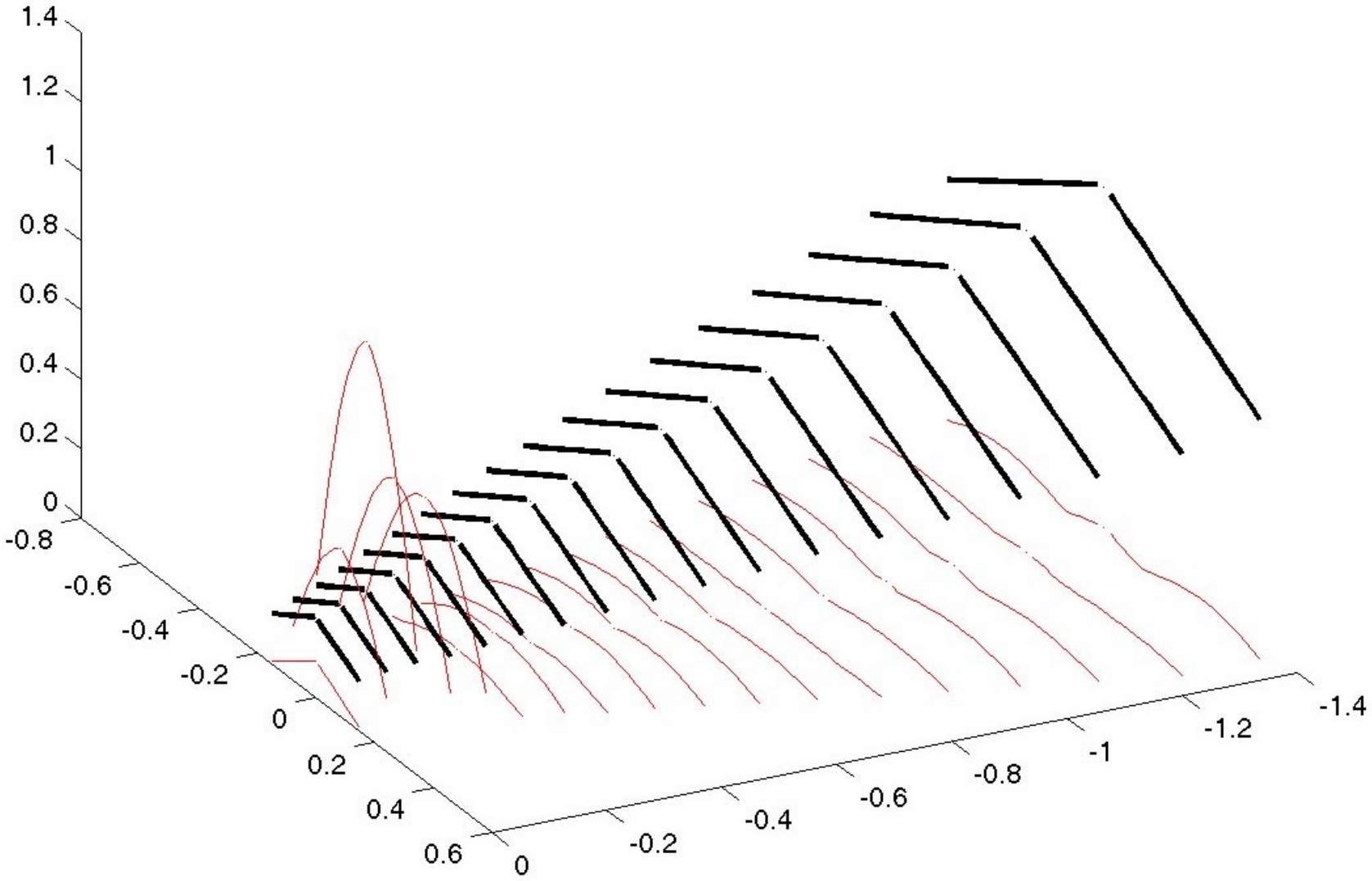

Vertical pattern of lp8m1fl7.dB G=8.39dB,F/B=20.66dB(theta=68,phi=0)
0
30
60
90
120
150
180
210
240
270
300
330
-25 -20 -15 -10 -5 0

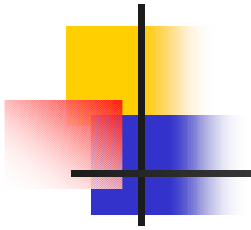
Lp8m1f17c.dat




3D Antenna pattern lp8m1f20p.dat
1
0.8
0.6
0.4
0.2
0
1
0.5
0
-0.5
1
0.5
0
-0.5
-1

Lp8m1f20c.dat

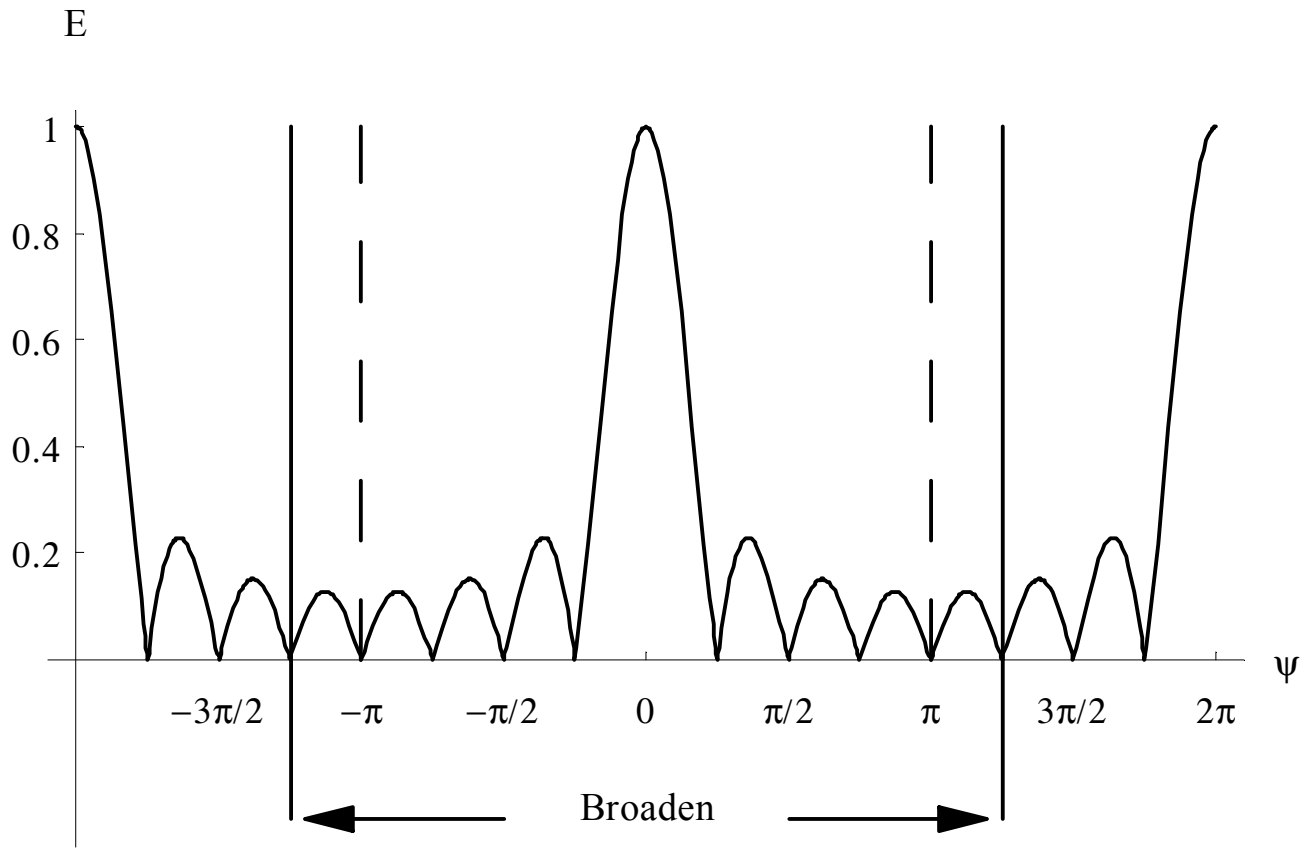




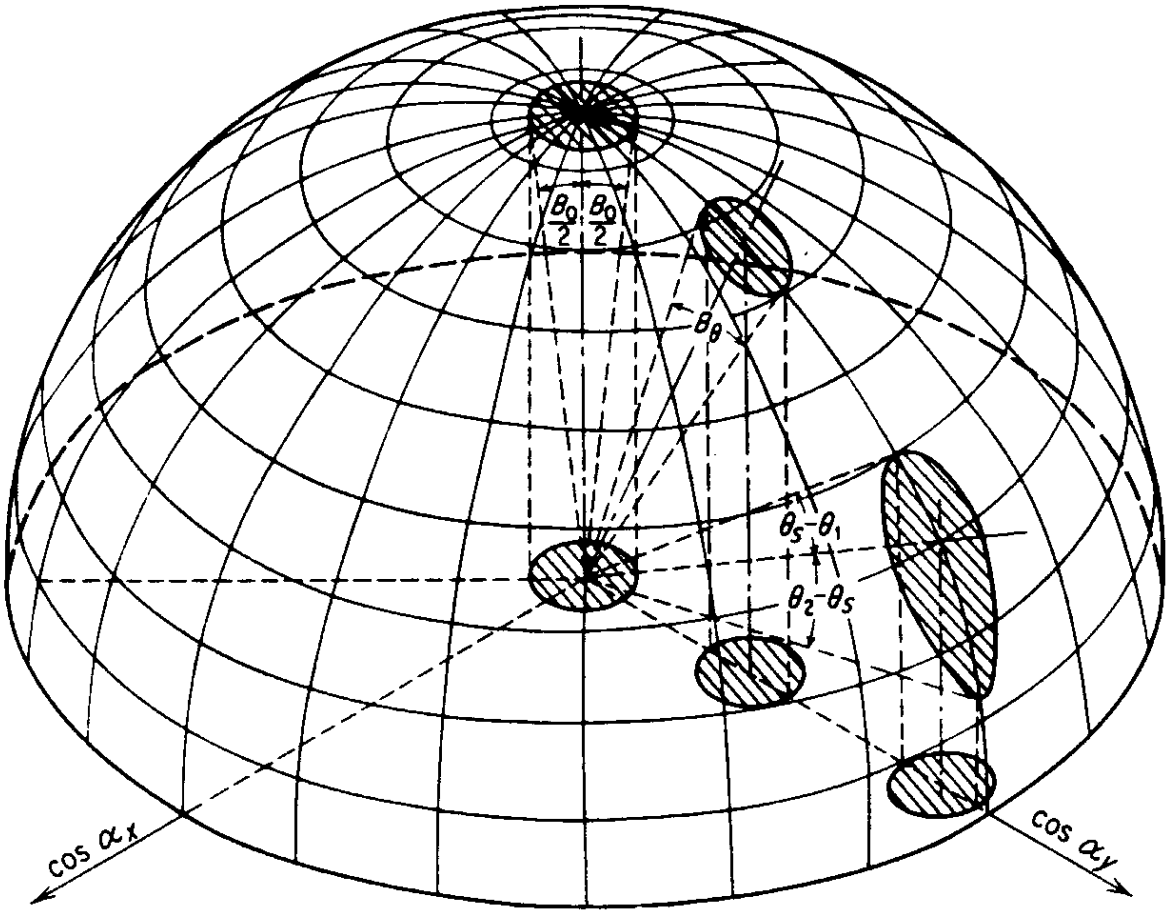
LPDA Linear Array

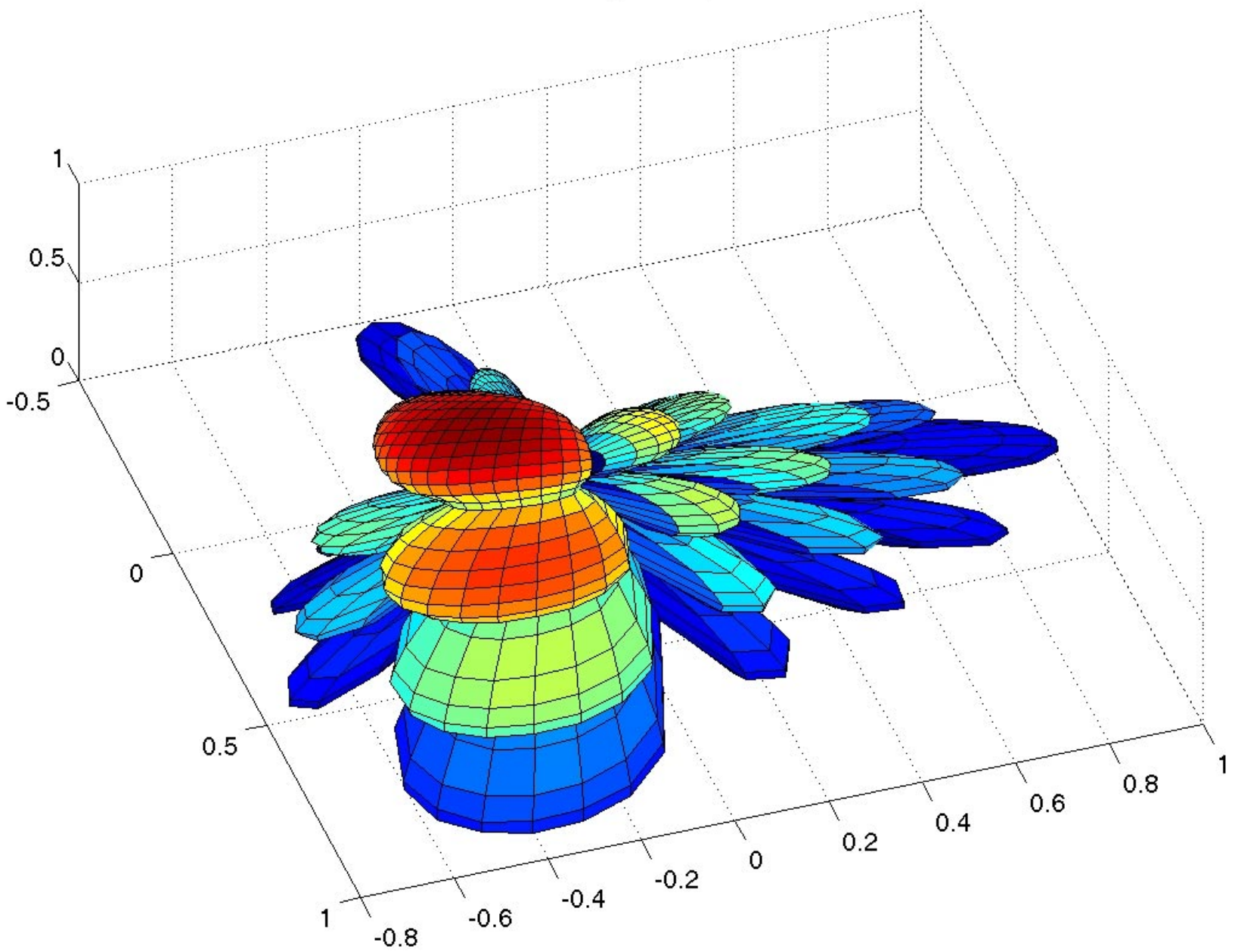
- Non constant electrical spacing
- Variation of gain
- Impedance effects
- Beamwidth variation

Electrical Spacing

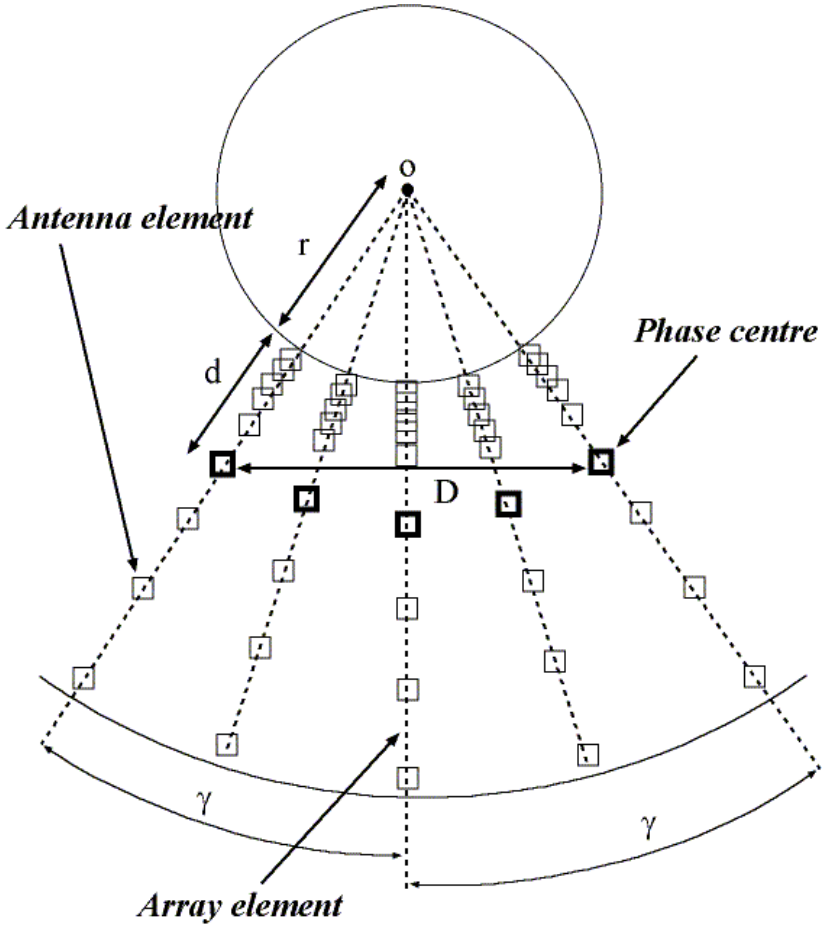


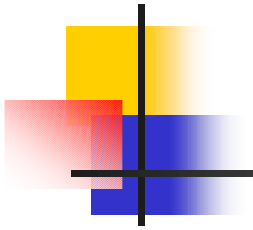
Beamwidth Variation




3D Antenna pattern lpa20.dat
1
0.5
0
-0.5
0
0.5
1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1

Semi-Circular Array





Conclusion

- Inverted-V LPDA
- Implementation of semi-circular array

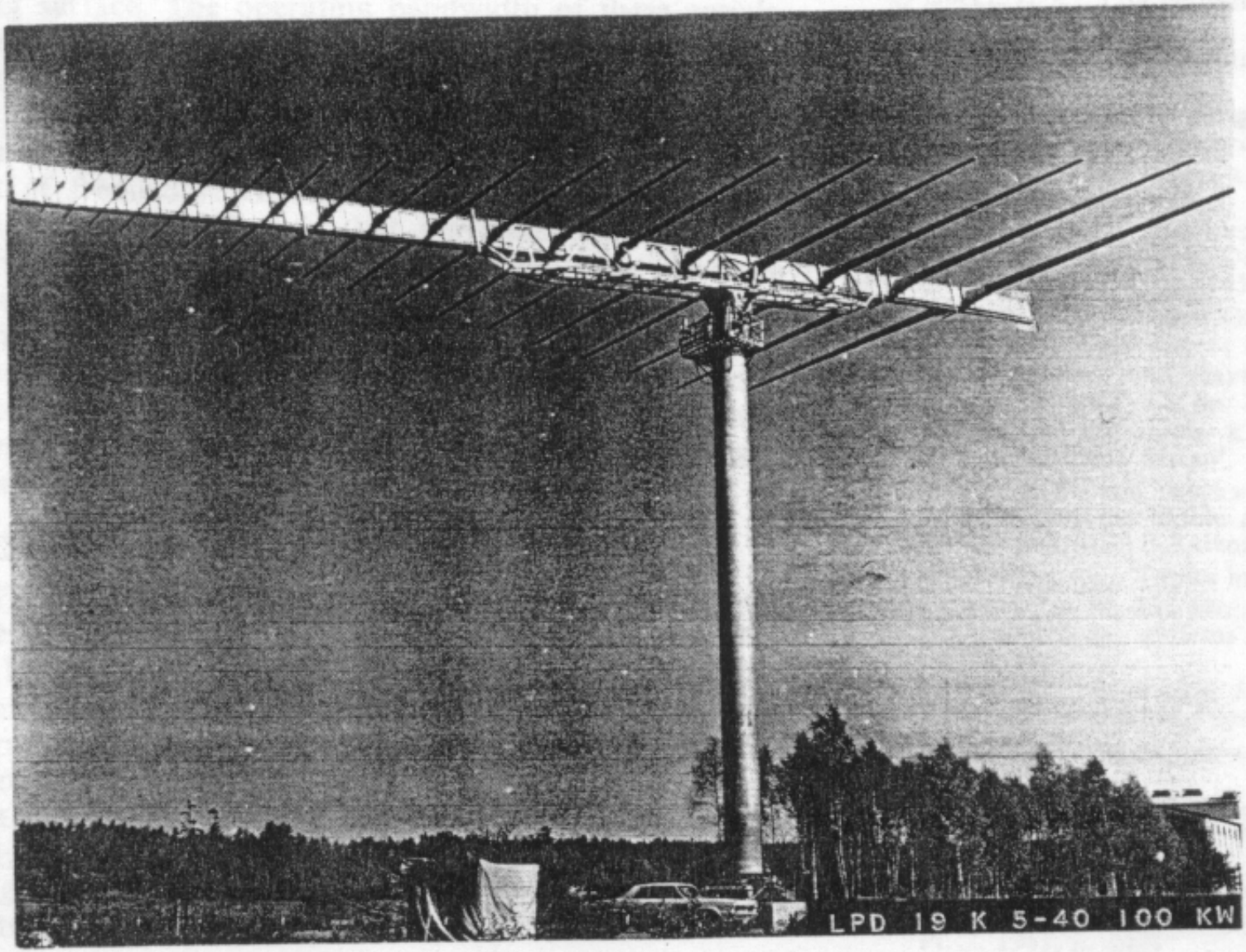


Fig. 10

Tilting rotatable log-periodic array

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