Ingenieurbüro Baumann --- www.leobaumann.de --- Markt 6, 46282 Dorsten
manuelle Berechnung eines Quad-Lazy-H-Dipols über Grund
h = Länge, b2 = Höhe über Grund (Unterkante), d = Dipolabstand, bet = Phasenverschiebung, l = Wellenlänge, Zl = Wellenwiderstand Feederleitung, d1 = Leiterabstand Leitung, d2 = Antennendistanz, dd = Drahtdurchmesser

```
reset():digits:=16:k:=1/1000:wh:=90*PI/180:wv:=73.0625*PI/180:h:=1/2
:dd:=2/1000:b2:=1/2:d:=3/8:l:=1:bet:=180*PI/180:Zl:=400:d1:=4/100:d2
:=1:
```

Richtdiagramm im Kugelraum als Funktion der Winkel

```
c:=(the,phi1) -> (abs((cos(PI*h/l*cos(the)*sin(phi1))-
cos(PI*h/l))/(sqrt(1-cos(the)^2*sin(phi1-k)^2)))
                  *2*abs(sin(bet/2+PI*2*d/l*cos(phi1)))
                  +abs((cos(PI*d/l*cos(phi1))-cos(PI*d/l))/sin(phi1))
                  *2*abs(cos(PI*d1/l*cos(the)*sin(phi1))))
                  *2*abs(cos(PI*d2/l*sin(the)*sin(phi1)))
                  *2*abs(cos(PI*d2/l*sin(phi1)*cos(the)))
                  *2*abs(sin(PI*2*(b2+d/2)/l*cos(phi1))):
```

Antennenimpedanzen pro Element nach BALANIS mittengespeist, feedgekoppelt über Zl=400 Ohm

```
Z:=float(60*(EULER+ln(2*PI*h/l)-
Ci(2*PI*h/l)+1/2*sin(2*PI*h/l)*(Si(4*PI*h/l)-
2*Si(2*PI*h/l))+1/2*cos(2*PI*h/l)*(EULER+ln(PI*h/l)+Ci(4*PI*h/l)-
2*Ci(2*PI*h/l)))+I*
         30*(2*Si(2*PI*h/l)+cos(2*PI*h/l)*(2*Si(2*PI*h/l)-
  Si(4*PI*h/l))-sin(2*PI*h/l)*(2*Ci(2*PI*h/l)-Ci(4*PI*h/l)-
  Ci(2*2*PI*dd^2/4/h/l/l^2)))):
```

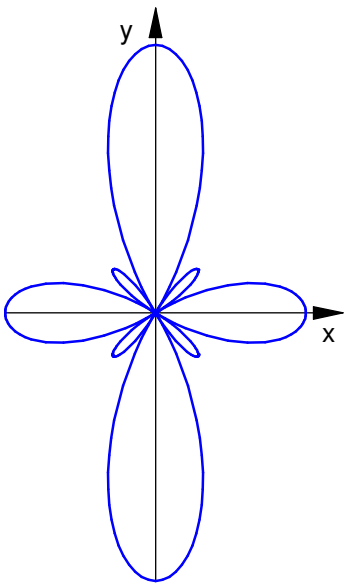
```
Zt:=(Z*cos(2*PI*l*d)+I*Zl*sin(2*PI*l*d))/(I*Z/Zl*sin(2*PI*l*d)+cos(2
*PI*l*d)):
```

```
Zin:=float(1/4*Z*Zt/(Z+Zt));
```

$$20.57622102 + 5.5887135 \cdot i$$

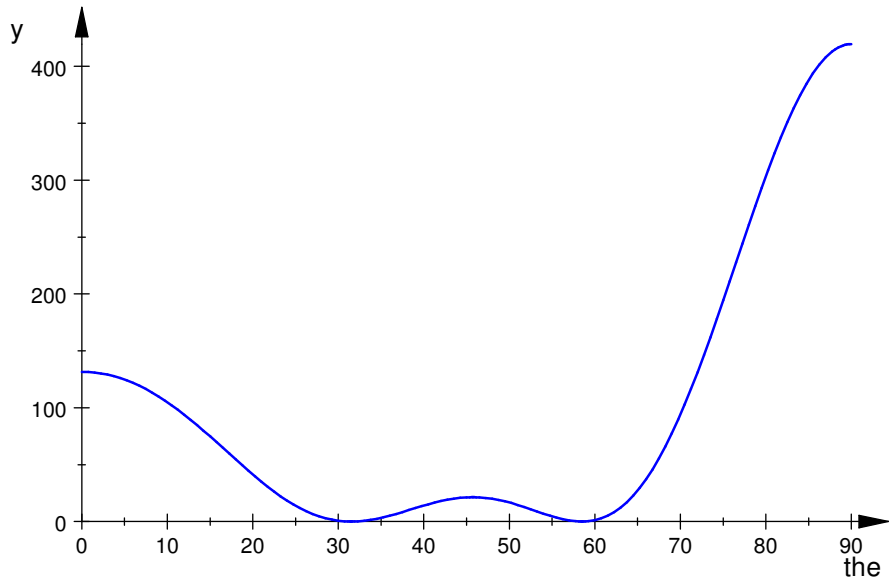
Horizontaldiagramm

```
plot(plot::Polar([c(the,wv),the], the = 0..2*PI, TicksNumber=None,
Scaling=Constrained, AdaptiveMesh=4));
```

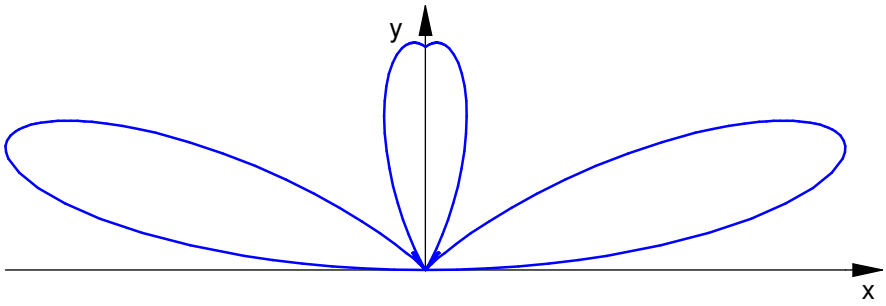
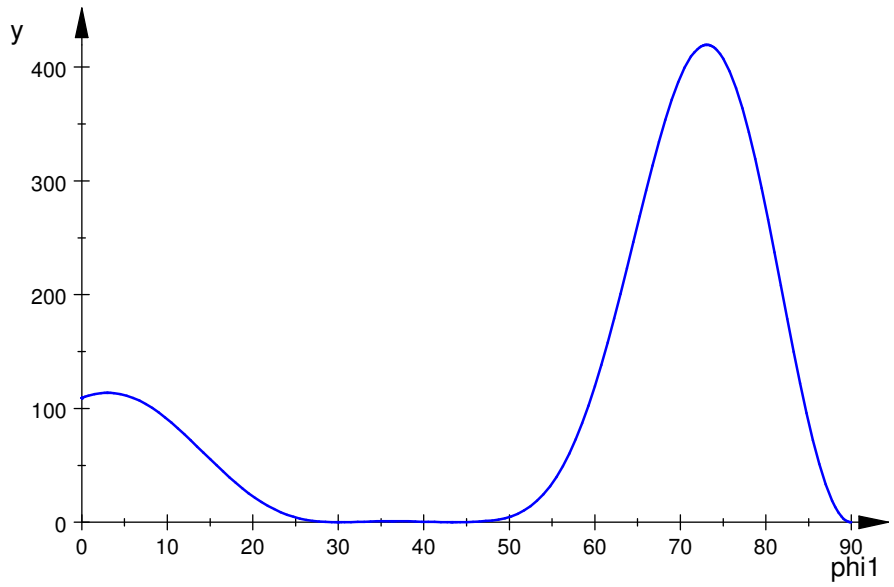


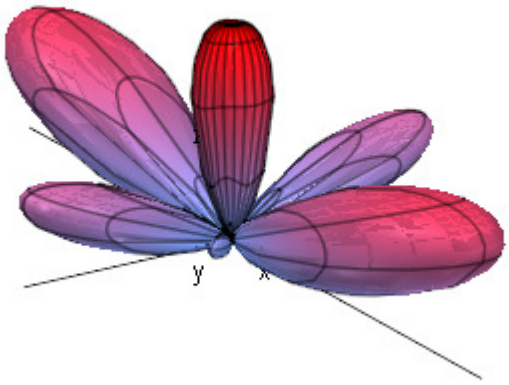
horizontale relative Strahlungsleistungsdichte

- `plotfunc2d(c(the*PI/180,wv)^2, the = 0..90, AdaptiveMesh=4):`



Maximalwert der relativen Stahlungsleistungsdichte , auch in dBi

- ```
  ghmax:=0:ghwmax:=0:for m from 2240 to 2879 step 1 do
  gh:=float(c(m*PI/5760,wv)^2);
  if gh>ghmax then
       ghmax:=gh;
       ghwmax:=float(m/32);
  end_if;
  end_for:ghmax;float(10*ln(ghmax)/ln(10)+2.15);ghwmax;
  ```
  ```

419.545747

28.37779323

89.96875

Vertikaldiagramm

- `plot(plot::Polar([c(wh,phi1),phi1+PI/2], phi1 = -PI/2..PI/2, TicksNumber=None, Scaling=Constrained, AdaptiveMesh=4));`



vertikale relative Strahlungsleistungsdichte

- `plotfunc2d(c(wh,phi1*PI/180)^2, phi1 = 0..90, AdaptiveMesh=4):`



-

Maximalwert der relativen Stahlungsleistungsdichte , auch in dBi

- ```
  gvmax:=0:gvwmax:=0:for m from 1920 to 2879 step 1 do
  gv:=float(c(wh,m*PI/5760)^2);
  if gv>gvmax then
       gvmax:=gv;
       gvwmax:=float(m/32);
  end_if;
  end_for:gvmax;float(10*ln(gvmax)/ln(10)+2.15);gvwmax;
  ```

  419.547022

  28.37780643

  73.0625

- ```
  delete
  the,phi1:graph:=plot::Surface([cos(the)*sin(phi1)*c(the,phi1),sin(th
  e)*sin(phi1)*c(the,phi1),cos(phi1)*c(the,phi1)],the=0..2*PI, phi1=-
  PI/2..PI/2,Axes=Origin, TicksNumber=None, Scaling=Constrained,
  AdaptiveMesh=4):
  ```
- ```
  plot(graph);
  ```
  ```


y
x