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

```
reset():digits:=16:ta:=time():k:=1/1000:wh:=90*PI/180:wv:=72.78125*PI/180:h:=1/2:dd:=2/1000:b2:=1/2:d:=3/8:l:=1:bet:=d*2*PI:Zl:=400:d1:=4/100:
```

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(sin(PI*2*(b2+d/2)/l*cos(phi1))):
```

Antennenimpedanzen 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)))):
```

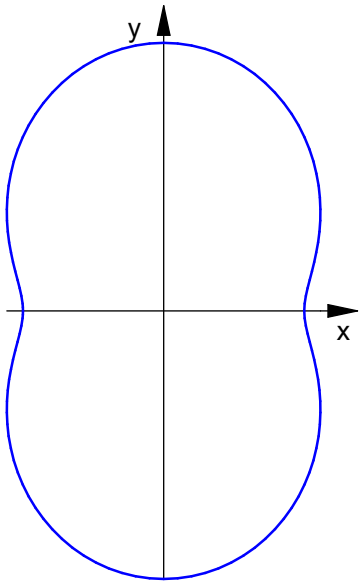
```
Zt:=(Z*cos(2*PI*l*d)+I*Zl*sin(2*PI*l*d))/(I*Z/Zl*sin(2*PI*l*d)+cos(2*PI*l*d)):
```

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

$$82.30488407 + 22.354854 \cdot i$$

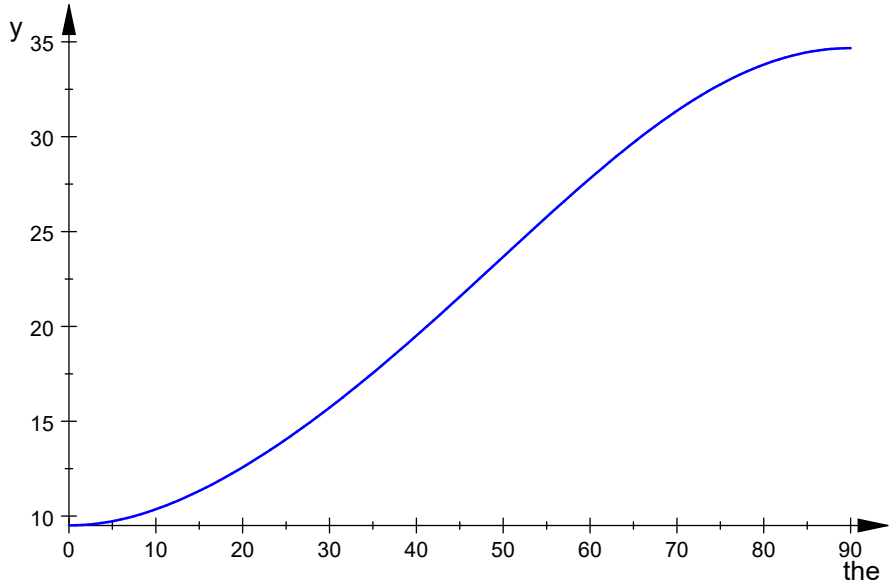
Horizontaldiagramm

```
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):`



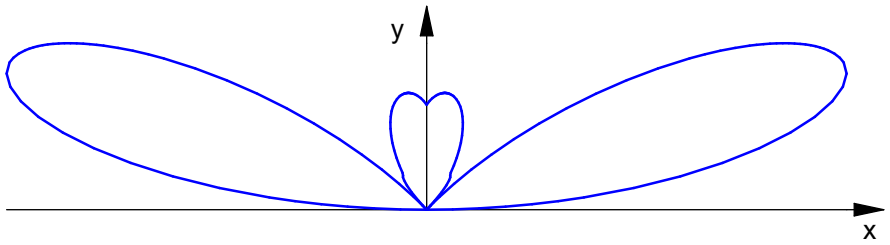
34.67182045

17.54976645

89.96875

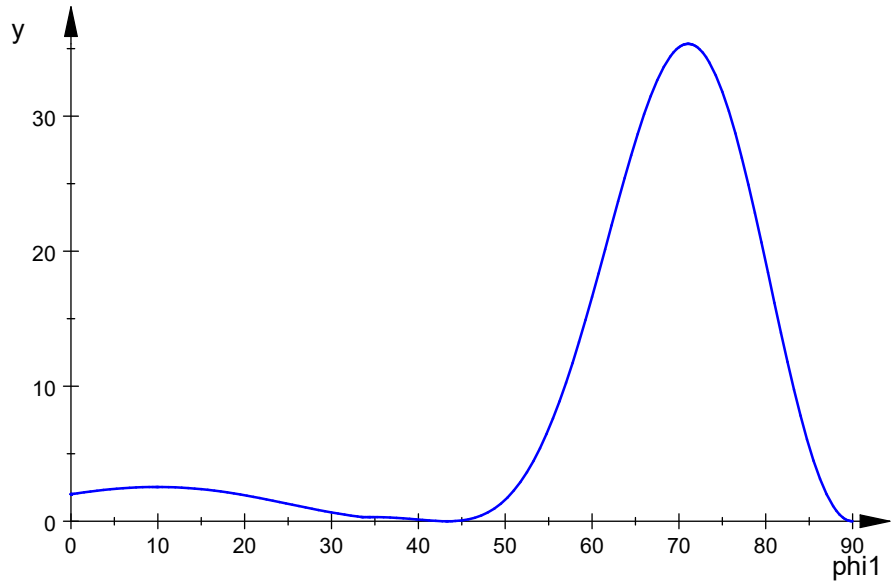
Vertikaldiagramm

- `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):`



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Maximalwert der relativen Stahlungsleistungsdichte , auch in dBi

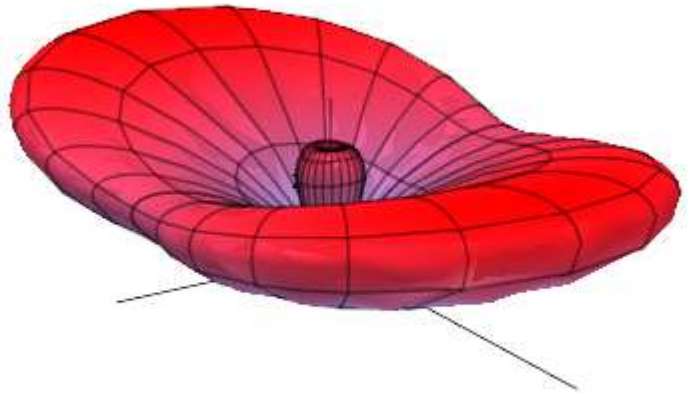
- ```
  gvmax:=0:gvwmax:=0:for m from 1600 to 2879 step 1 do
  gv:=float(c(wh,m*PI/5760)^2);
  if gv>gvmax then
       gvmax:=gv;
       gvwmax:=float(m/32);
  end_if;
  end_for:gvmax;float(10*log(10,gvmax)+2.15);gvwmax;
  ```

  35.35307545

  17.634272

  71.0625

- ```
  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):
  ```
  ```



- `float((time()-ta)/1000);float((time()-ta)/60000);`

  22.64

  0.3773333333

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