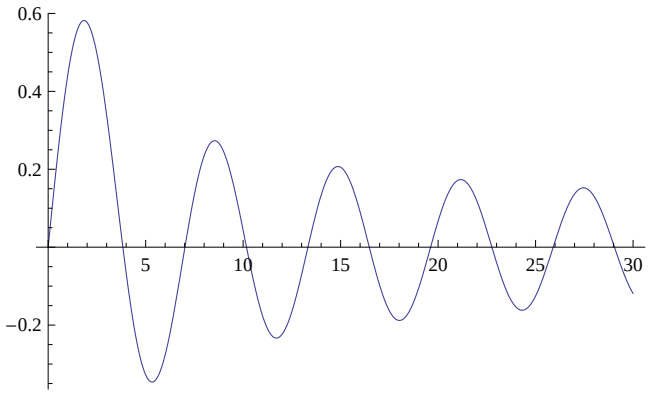
DEMONSTRATION

PLOT

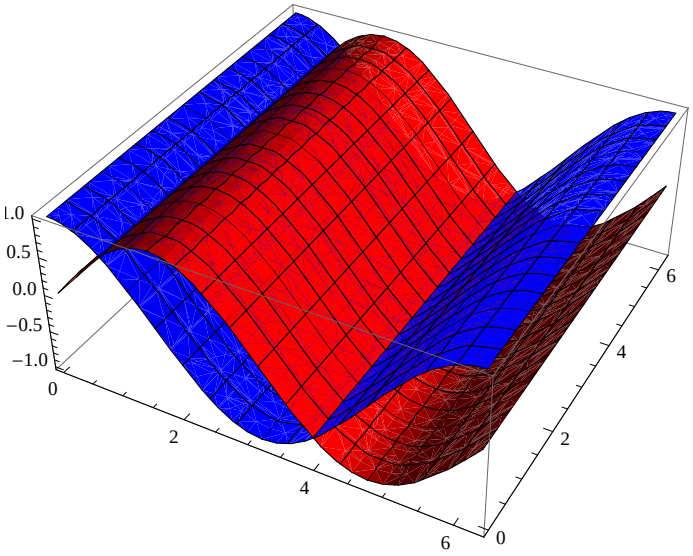
In[1]:=
```
Plot[BesselJ[1, x], {x, 0, 30}]
```

Out[1]=



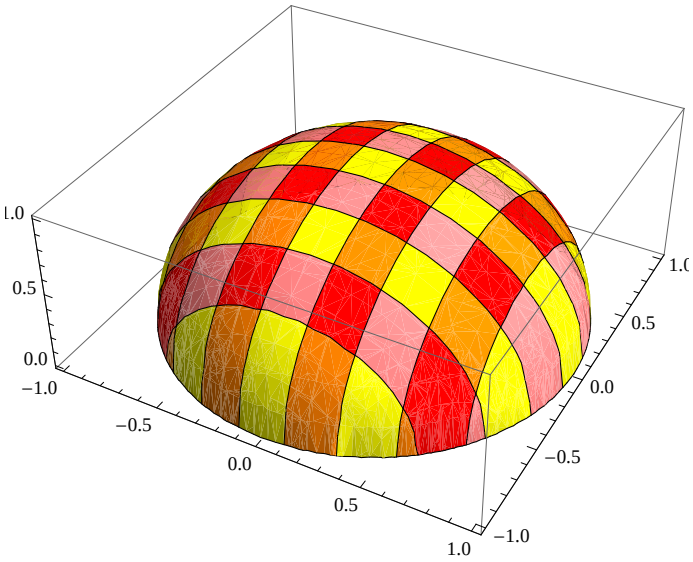
In[2]:=
```
Plot3D[{Sin[x], Cos[x]}, {x, 0, 2 Pi}, {y, 0, 2 Pi}, PlotStyle → {Red, Blue}]
```

Out[2]=



In[3]:=
```
Plot3D[Sqrt[1 - x^2 - y^2], {x, -1, 1}, {y, -1, 1}, Mesh → 8,
 ColorFunction → Hue, MeshShading → {{Yellow, Orange}, {Pink, Red}}]
```

Out[3]=

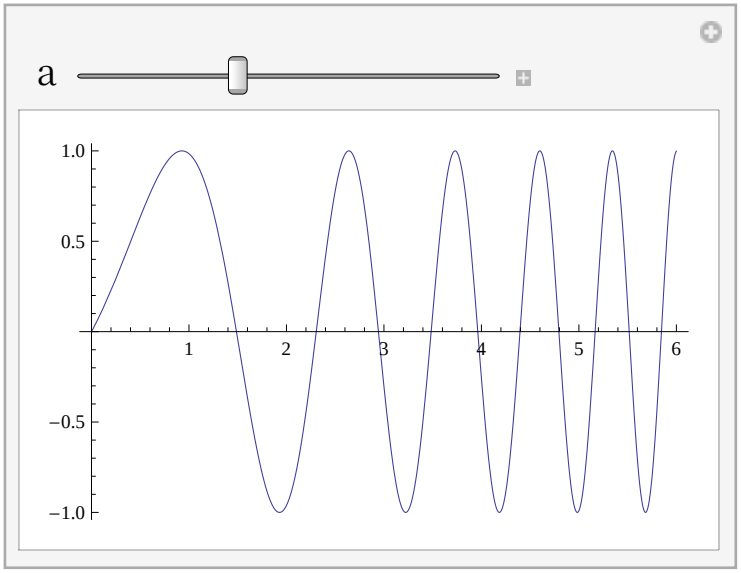


MANIPULATE

In[4]:=

```
Manipulate[Plot[Sin[x (1 + a x)], {x, 0, 6}], {a, 0, 2}]
```

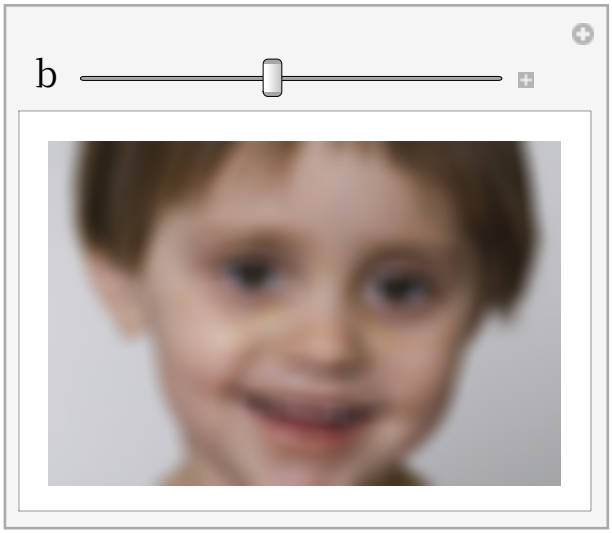
Out[4]=



In[5]:=

```
Manipulate[Blur[ , b], {b, 0, 10}]
```

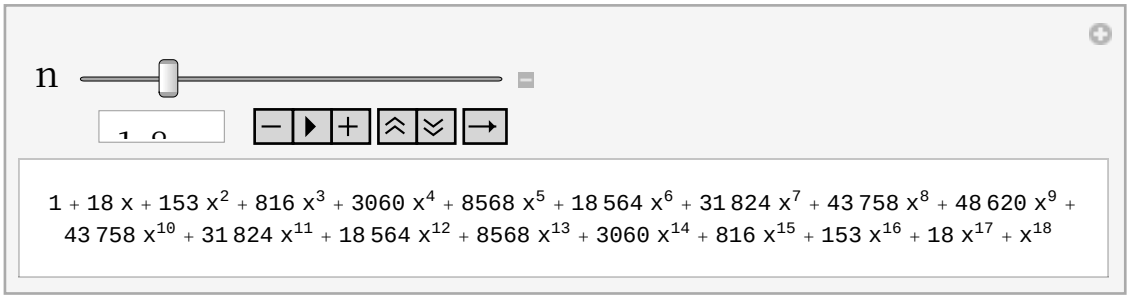
Out[5]=



In[6]:=

```
Manipulate[Expand[(1 + x)^n], {n, 0, 100, 1}]
```

Out[6]=



CALCULATE

```
100 000 !
```

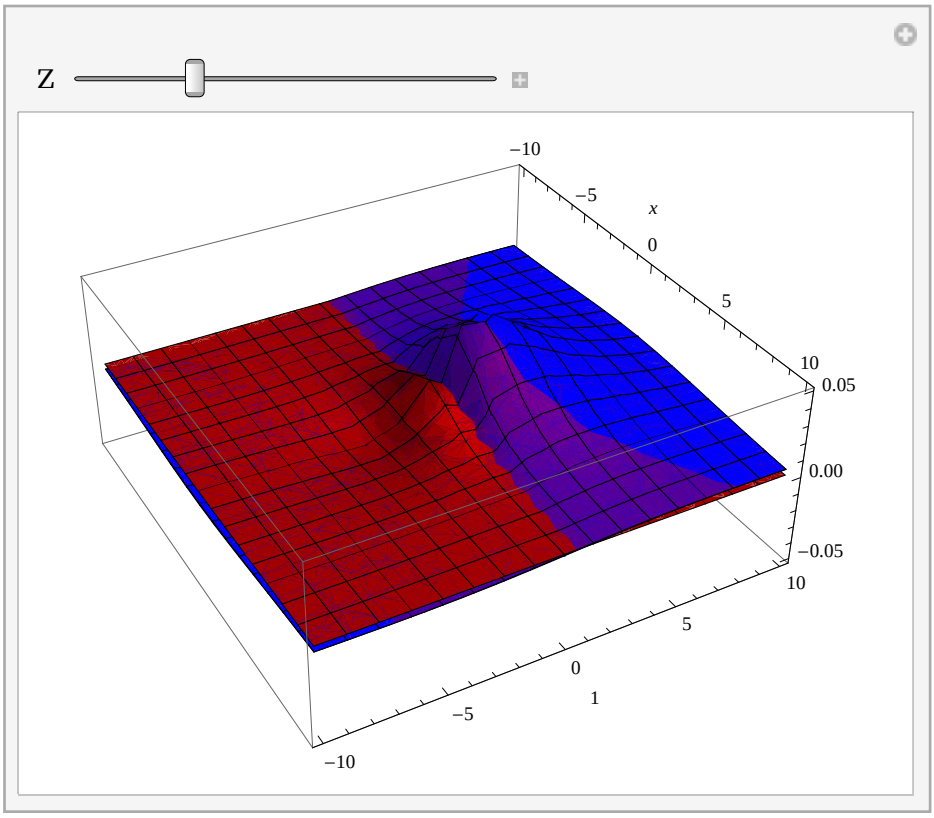
```
N[Pi, 500 000]
```

MY WORK

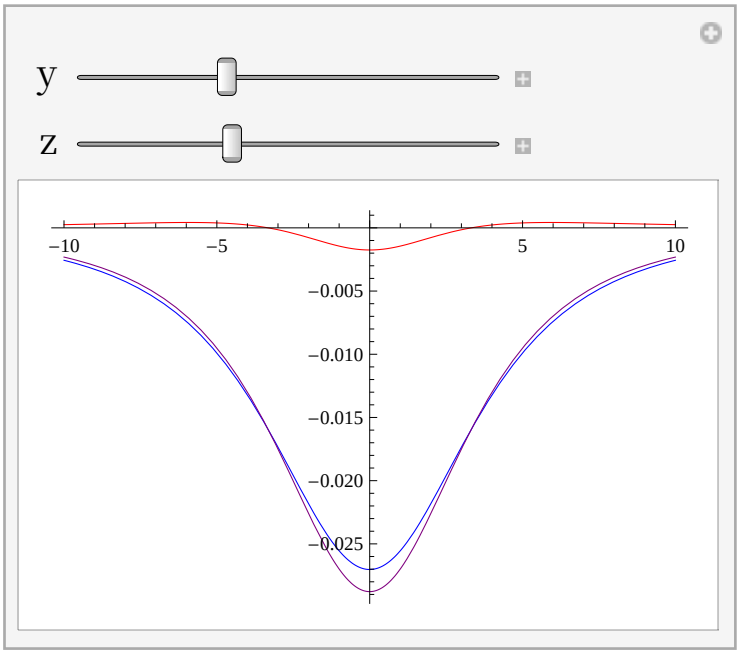
偶极子电势展示

```
r1 = {0, 0, 0}; r2 = {0, 1, 0}; q1 = -1; q2 = 1; rn = 10;
ϕ[x_, y_, z_] = q1/Norm[{x, y, z} - r1] + q2/Norm[{x, y, z} - r2];
ϕ1[x_, y_, z_] = (r2 - r1).{x, y, z}/Norm[{x, y, z} - r1]^3;
ϕ2[x_, y_, z_] = ϕ1[x, y, z] - ϕ[x, y, z];
Manipulate[Plot3D[{ϕ[x, y, z], ϕ1[x, y, z], ϕ2[x, y, z]},
  {x, -rn, rn}, {y, -rn, rn}, PlotRange → All,
  PlotStyle → {Blue, Purple, Red}, AxesLabel → Automatic], {z, 0.1, rn}]
Manipulate[Plot[{ϕ[x, y, z], ϕ1[x, y, z], ϕ2[x, y, z]}, {x, -rn, rn},
  PlotRange → All, PlotStyle → {Blue, Purple, Red}], {y, -rn, rn}, {z, 0, rn}]
```

Out[81]=



Out[82]=



偶极子电场公式推导

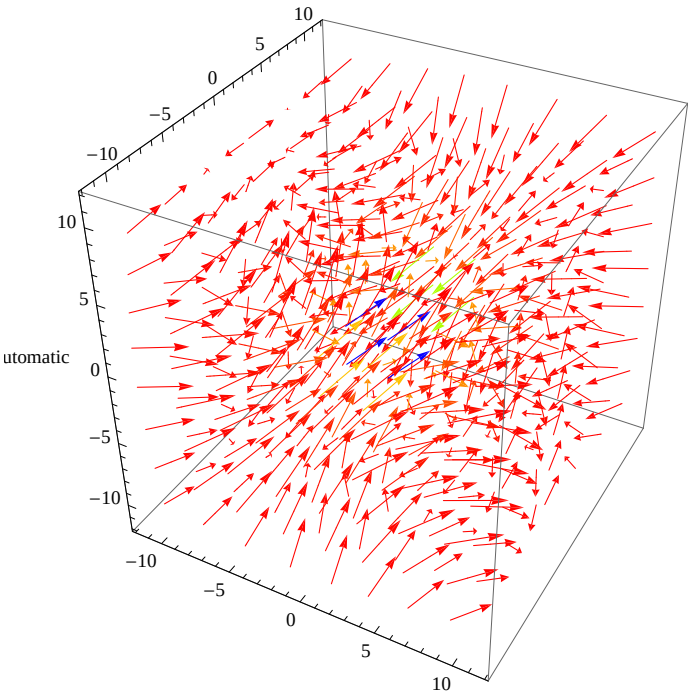
```
Needs["VectorAnalysis`"];
Grad[ϕ1[x, y, z], Cartesian[x, y, z]]
```

偶极子电场展示

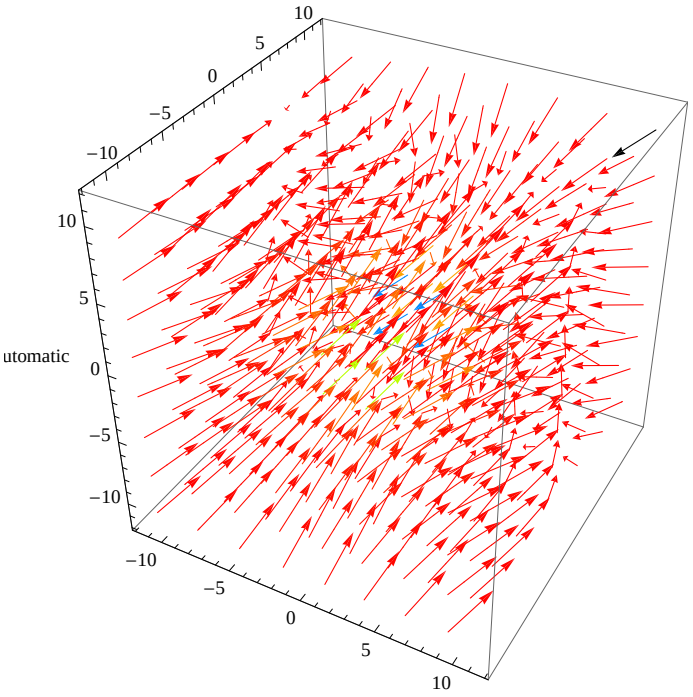
In[83]:=

```
rn = 10;
{Ex0[y_], Ey0[y_], Ez0[y_]} =
  {-Abs[x]/(Abs[x]^2 + Abs[-1 + y]^2 + Abs[z]^2)^(3/2) + Abs[x]/(Abs[x]^2 + Abs[y]^2 + Abs[z]^2)^(3/2),
   -Abs[-1 + y]/(Abs[x]^2 + Abs[-1 + y]^2 + Abs[z]^2)^(3/2) + Abs[y]/(Abs[x]^2 + Abs[y]^2 + Abs[z]^2)^(3/2),
   -Abs[z]/(Abs[x]^2 + Abs[-1 + y]^2 + Abs[z]^2)^(3/2) + Abs[z]/(Abs[x]^2 + Abs[y]^2 + Abs[z]^2)^(3/2)};
{Ex1[y_], Ey1[y_], Ez1[y_]} = {-(3 y Abs[x])/(Abs[x]^2 + Abs[y]^2 + Abs[z]^2)^(5/2),
   1/(Abs[x]^2 + Abs[y]^2 + Abs[z]^2)^(3/2) - (3 y Abs[y])/(Abs[x]^2 + Abs[y]^2 + Abs[z]^2)^(5/2),
   -(3 y Abs[z])/(Abs[x]^2 + Abs[y]^2 + Abs[z]^2)^(5/2)};
VectorPlot3D[{Ex0[y], Ey0[y], Ez0[y]}, {x, -rn, rn}, {y, -rn, rn},
 {z, -rn, rn}, VectorScale → {Large, Scaled[0.3], None},
 VectorColorFunction → Hue, AxesLabel → Automatic]
VectorPlot3D[{Ex1[y], Ey1[y], Ez1[y]}, {x, -rn, rn}, {y, -rn, rn},
 {z, -rn, rn}, VectorScale → {Large, Scaled[0.3], None},
 VectorColorFunction → Hue, AxesLabel → Automatic]
```

Out[86]=



Out[87]=

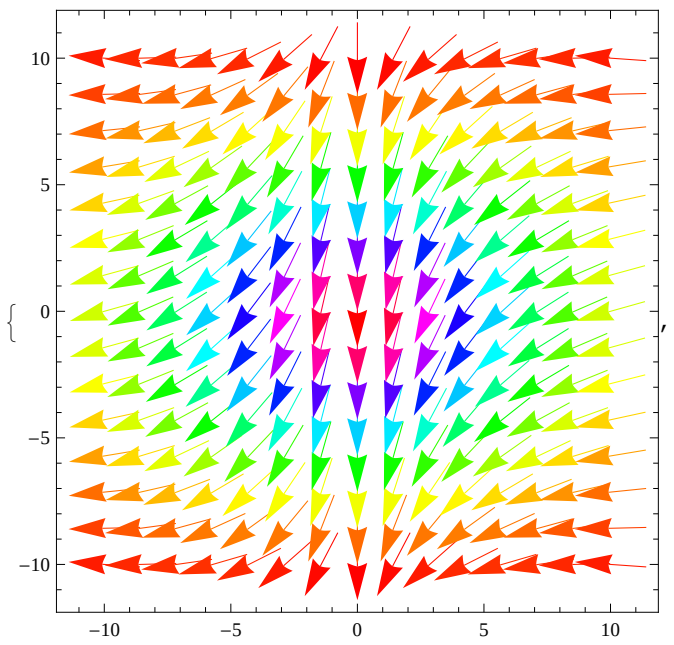


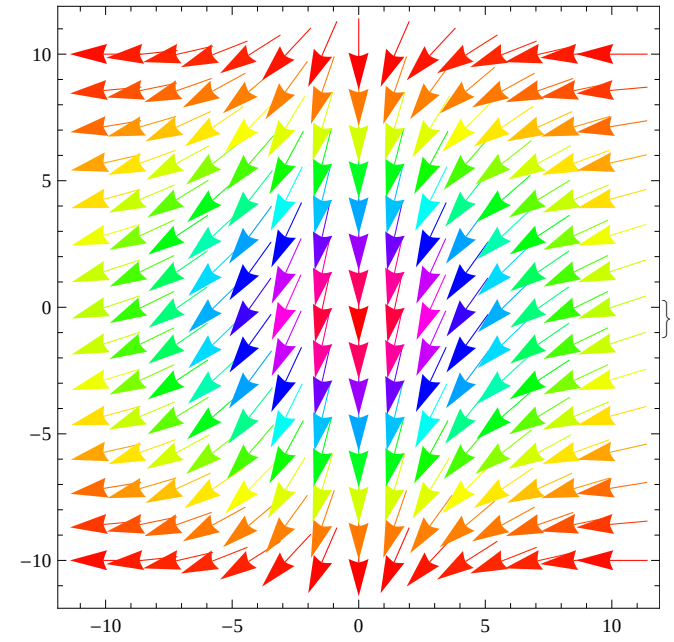
In[67]:=

```
rn = 10;
Manipulate[{VectorPlot[{Ex0[y], Ey0[y]}, {x, -rn, rn}, {z, -rn, rn},
    VectorScale → {Large, Automatic, None}, VectorColorFunction → Hue],
  VectorPlot[{Ex1[y], Ey1[y]}, {x, -rn, rn}, {z, -rn, rn},
    VectorScale → {Large, Automatic, None}, VectorColorFunction → Hue]}, {y, 0, 10}]
```

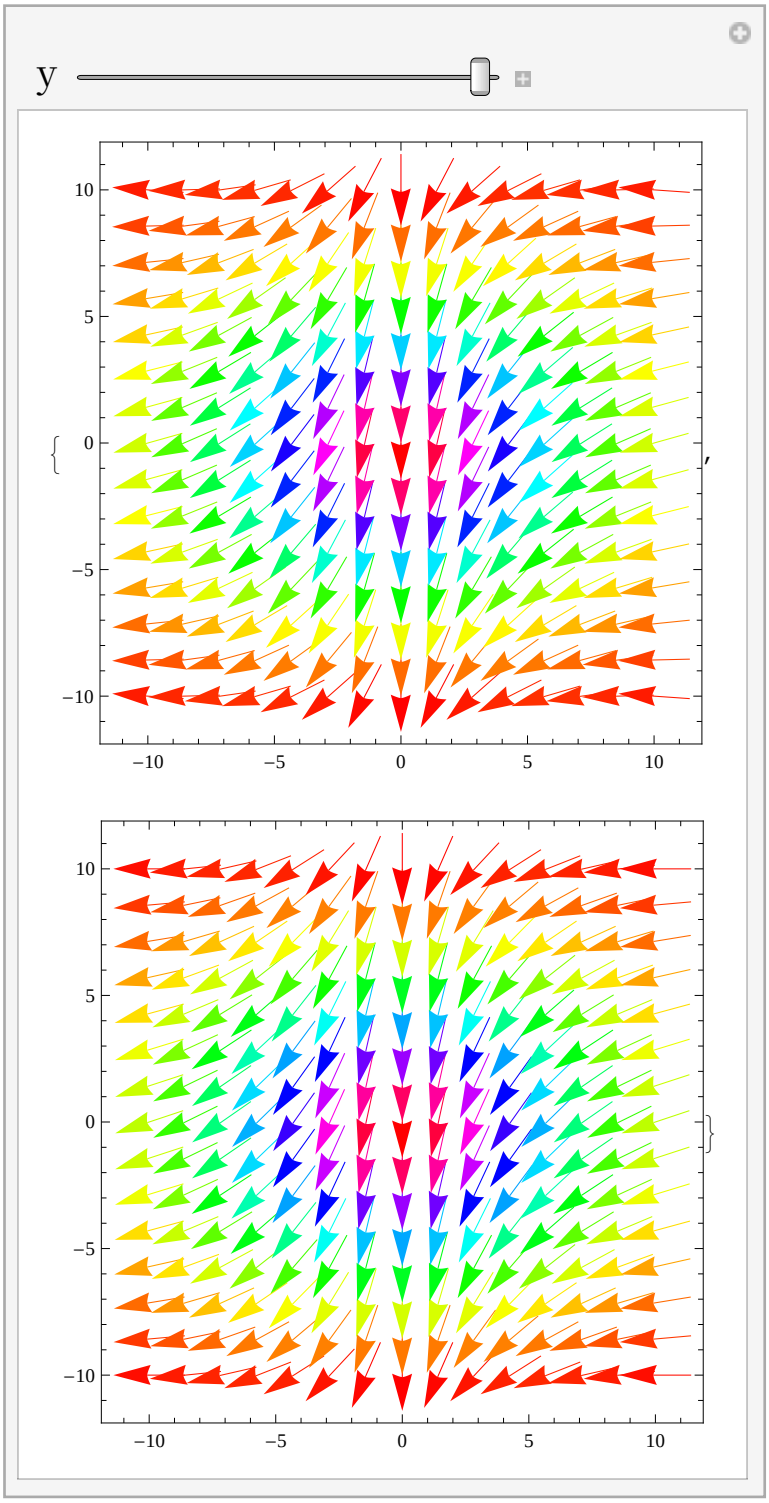
In[75]:=

y





Out[75]=



谐振腔场分布展示

In[88]:=

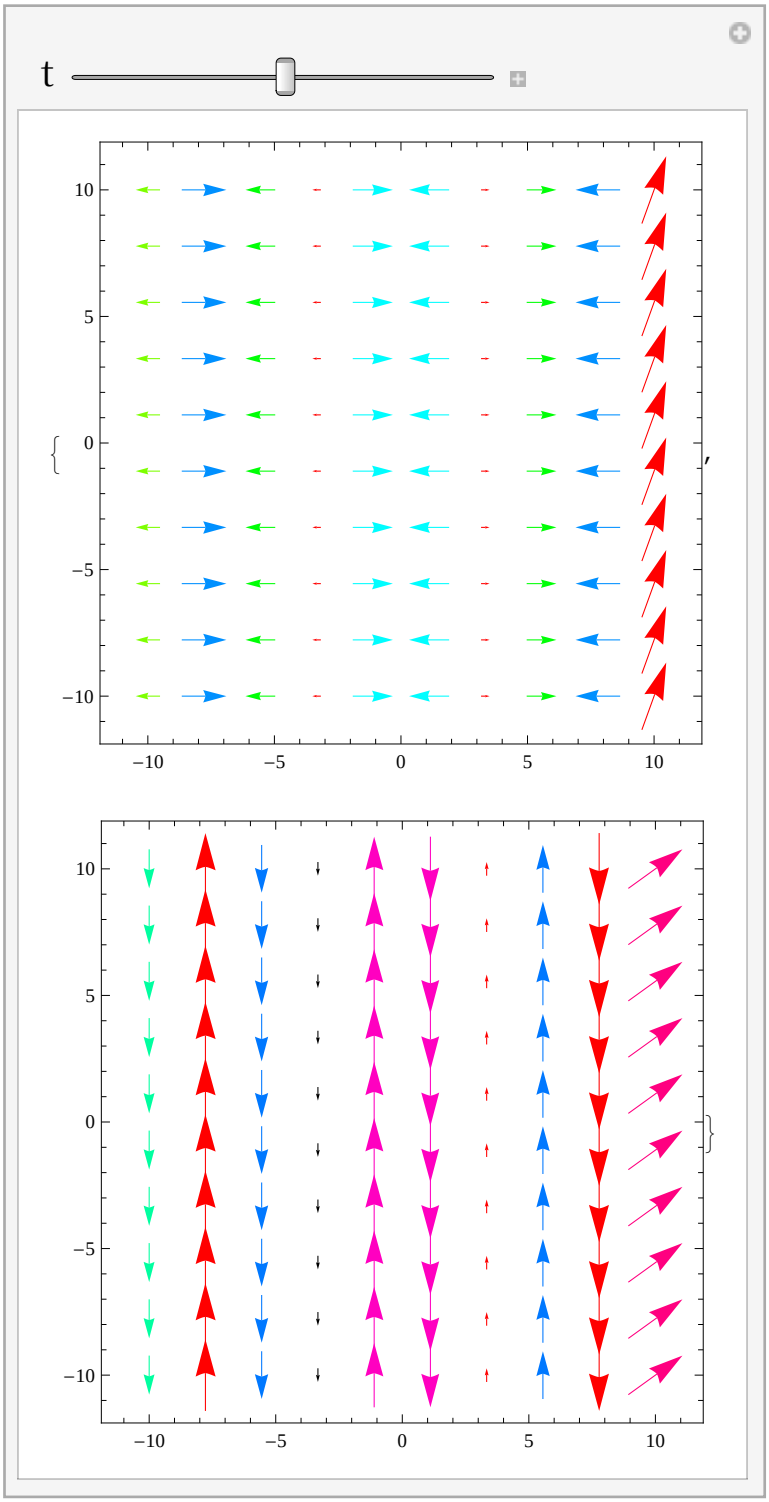
```
rn = 10;
Bx[t_] := Re[-2 I * Sin[x] * Cos[z] * e^(I*t)];
By[t_] := 0;
Bz[t_] := Re[2 I * Cos[x] * Sin[z] * e^(I*t)];

Ex8[t_] := 0;
Ey8[t_] := Re[-2 Sin[x] Sin[z] e^(I*t)];
Ez8[t_] := 0;

z = 1;

Manipulate[
 {VectorPlot[{Bx[t], If[x < 8, 0, 1]}, {x, -rn, rn}, {y, -rn, rn}, VectorScale →
    {Large, Automatic, Automatic}, VectorColorFunction → Hue, VectorPoints → 10],
  VectorPlot[{If[x < 8, 0, 1], Ey8[t]}, {x, -rn, rn}, {y, -rn, rn},
   VectorScale → {Large, Automatic, Automatic},
   VectorColorFunction → Hue, VectorPoints → 10]}, {t, 1, 10}]
```

Out[96]=



谐振腔能量分布展示

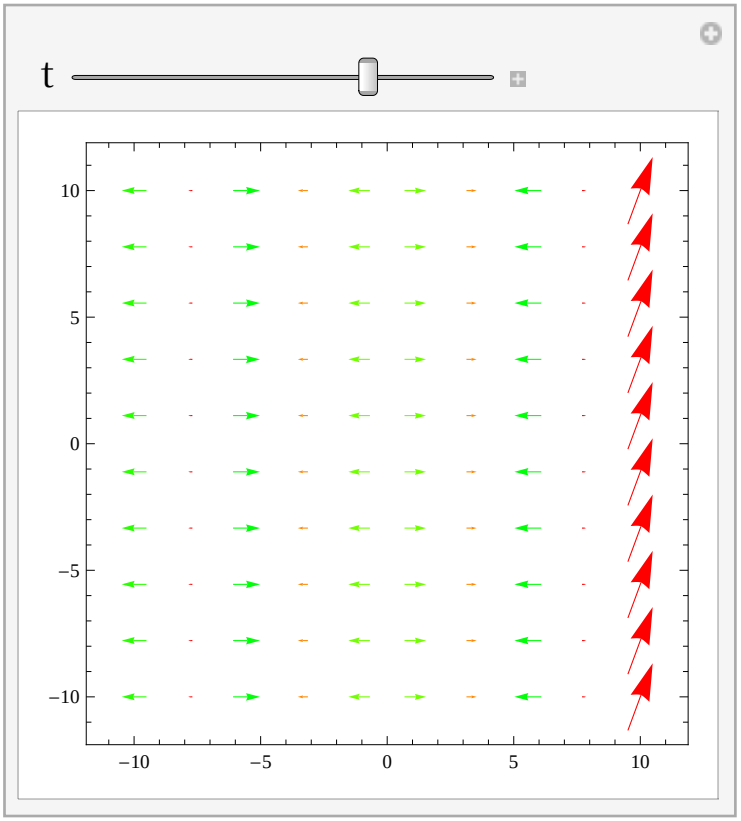
In[97]:=

```
{Sx[t_], Sy[t_], Sz[t_]} = Cross[{Ex8[t], Ey8[t], Ez8[t]}, {Bx[t], By[t], Bz[t]}]

Manipulate[VectorPlot[{Sx[t], If[x < 8, 0, 1]}, {x, -rn, rn},
  {y, -rn, rn}, VectorScale → {Large, Automatic, Automatic},
  VectorColorFunction → Hue, VectorPoints → 10], {t, 1, 10}]
```

Out[97]= $\{4\,\text{Im}\left[e^{i\,t}\,\text{Cos}[x]\right]\,\text{Re}\left[e^{i\,t}\,\text{Sin}[x]\right]\,\text{Sin}[1]^2,\ 0,\ 4\,\text{Cos}[1]\,\text{Im}\left[e^{i\,t}\,\text{Sin}[x]\right]\,\text{Re}\left[e^{i\,t}\,\text{Sin}[x]\right]\,\text{Sin}[1]\}$

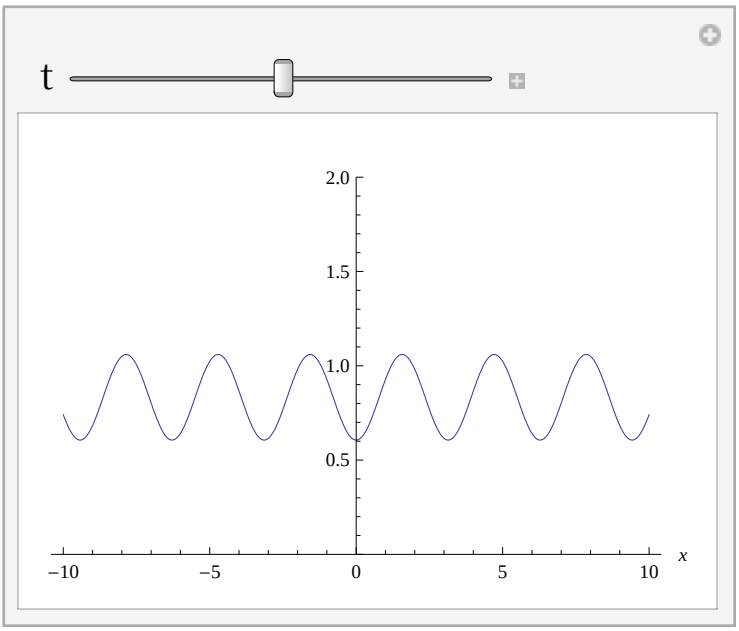
Out[98]=



In[99]:=

```
u[t_] := (Norm[{Ex8[t], Ey8[t], Ez8[t]}]^2 + Norm[{Bx[t], By[t], Bz[t]}]^2) / 2;
y = 1;
Manipulate[
 Plot[u[t], {x, -rn, rn}, PlotRange → {0, 2}, AxesLabel → Automatic], {t, 1, 10}]
```

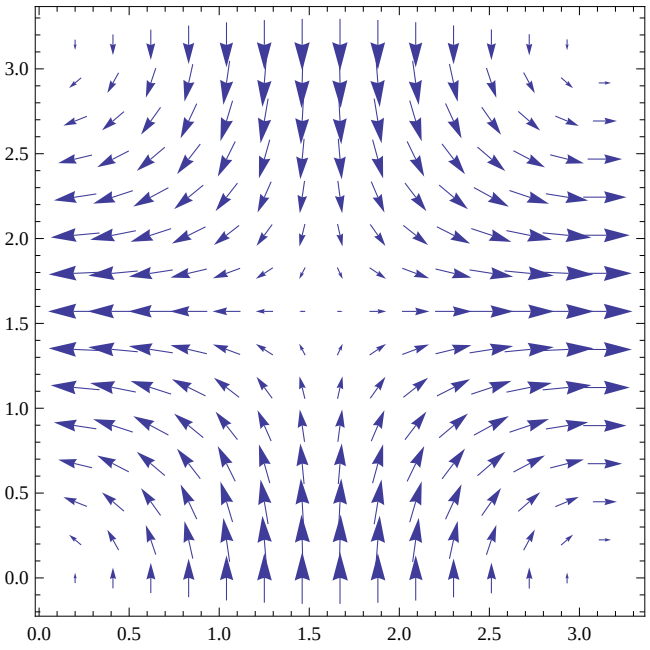
Out[101]=



习题９．４Ｈ１１场分布展示

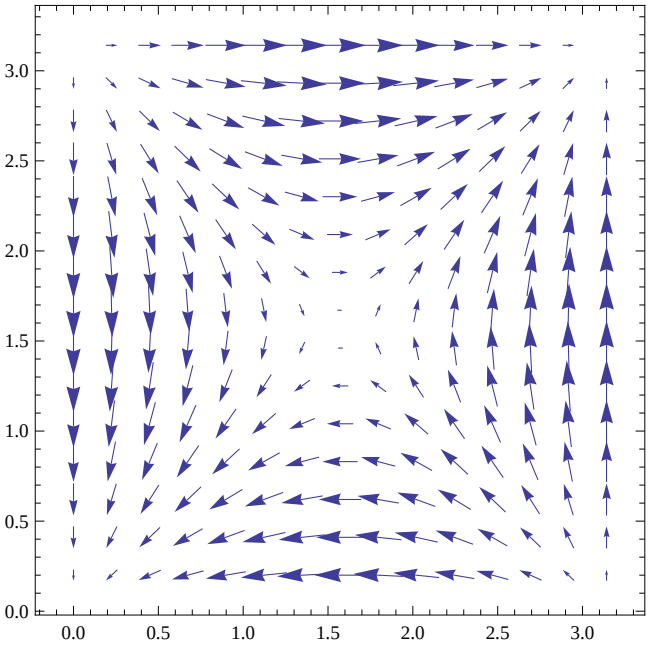
In[37]:=
```
VectorPlot[{-Cos[x] Sin[y], Sin[x] Cos[y]}, {x, 0.2, Pi}, {y, 0, Pi}]
```

Out[37]=



In[38]:=
```
VectorPlot[{-Sin[x] Cos[y], -Cos[x] Sin[y]}, {x, 0, Pi}, {y, 0.2, Pi}]
```

Out[38]=



CONCLUSION

优点：

1.毋庸置疑（但不是无限）的符号和数值运算能力

2.花费时间可做出漂亮的展示

缺点：

1．与COMSOL等专业软件相比：全面有余，专业不足

2.与C,DELPHI等编程语言相比：灵活有余，严谨不足