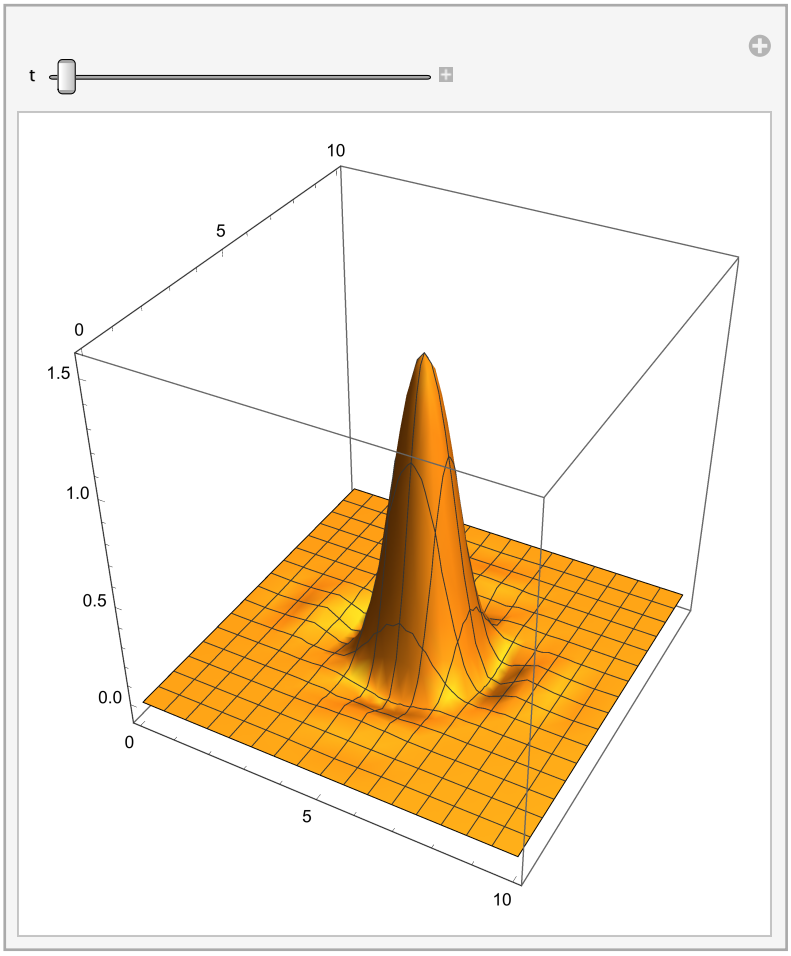
In[345]:=

```
Clear[a, b, c, n, m, f, g, K, L, x, y];
k := 0.5
L := 10
H := 10
nTerms := 10
tVal := {0, 0.1, 0.2, 1, 10, 25, 50, 100, 500}
f[x_, y_] := Piecewise[{{1, 4 < x < 6 && 4 < y < 6}, {0, x ≤ 4 && x ≥ 6 && y ≤ 4 && y ≥ 6}}]

lambda[m_, n_] := (π m / H)^2 + (π n / L)^2

phi[x_, n_] := Sin[π n x / L]

psi[y_, m_] := Sin[π m y / H]

ht[t_, m_, n_] := e^(k t (-lambda[m,n]))

Cmn[m_, n_] := 4 ∫_0^L phi[x, n] ∫_0^H f[x, y] psi[y, m] dy dx / (H L)

u[x_, y_, t_, M_, N_] := Sum_{m=1}^{M} (Sum_{n=1}^{N} Cmn[m, n] psi[y, m] phi[x, n] ht[t, m, n])
z[x_, y_, t_] := Evaluate[u[x, y, t, nTerms, nTerms]]
```

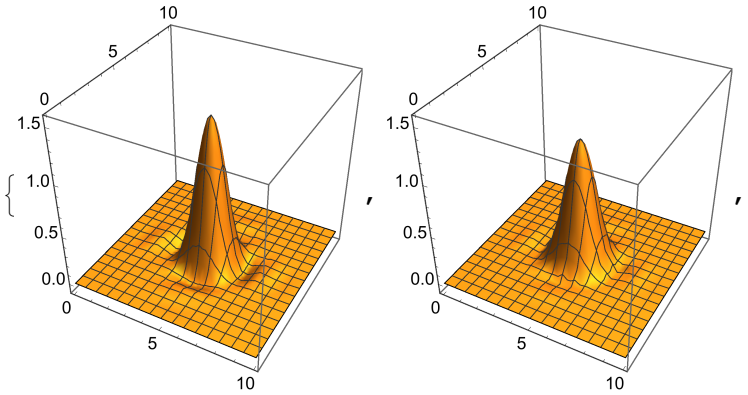
```
Manipulate[Plot3D[z[x, y, t], {x, 0, L}, {y, 0, H},
  BoxRatios → {1, 1, 1}, PlotRange → {-0.1, 1.6}], {t, 0, 10, .5}]
```

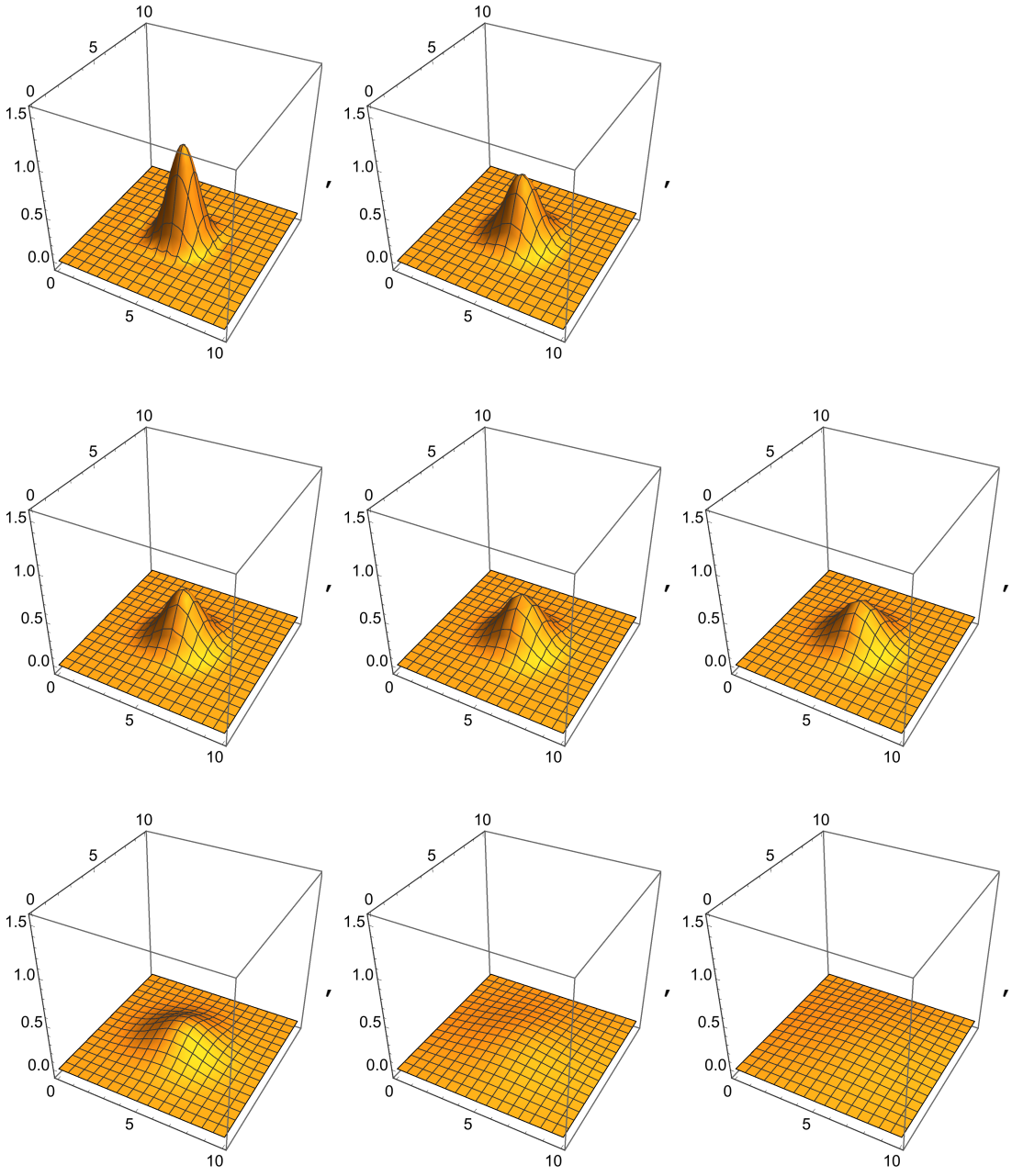


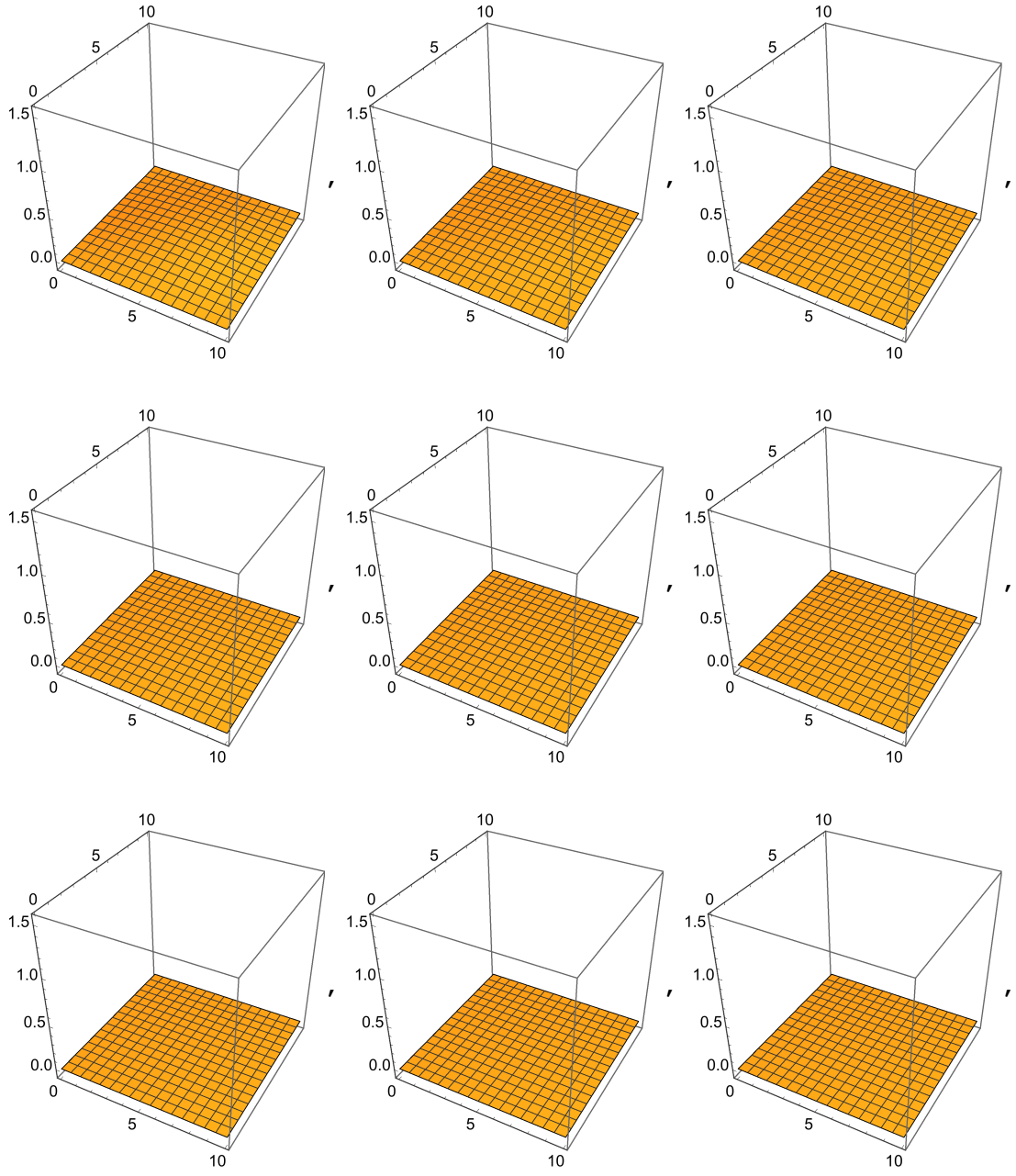
In[359]:=
```
tplot := Table[Plot3D[z[x, y, t], {x, 0, L}, {y, 0, H}, BoxRatios → {1, 1, 1},
    PlotRange → {-0.1, 1.6}], {t, {0, 0.1, 0.2, 0.5, 0.7, 0.8, 1, 2, 5,
     8, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 500}}]
```

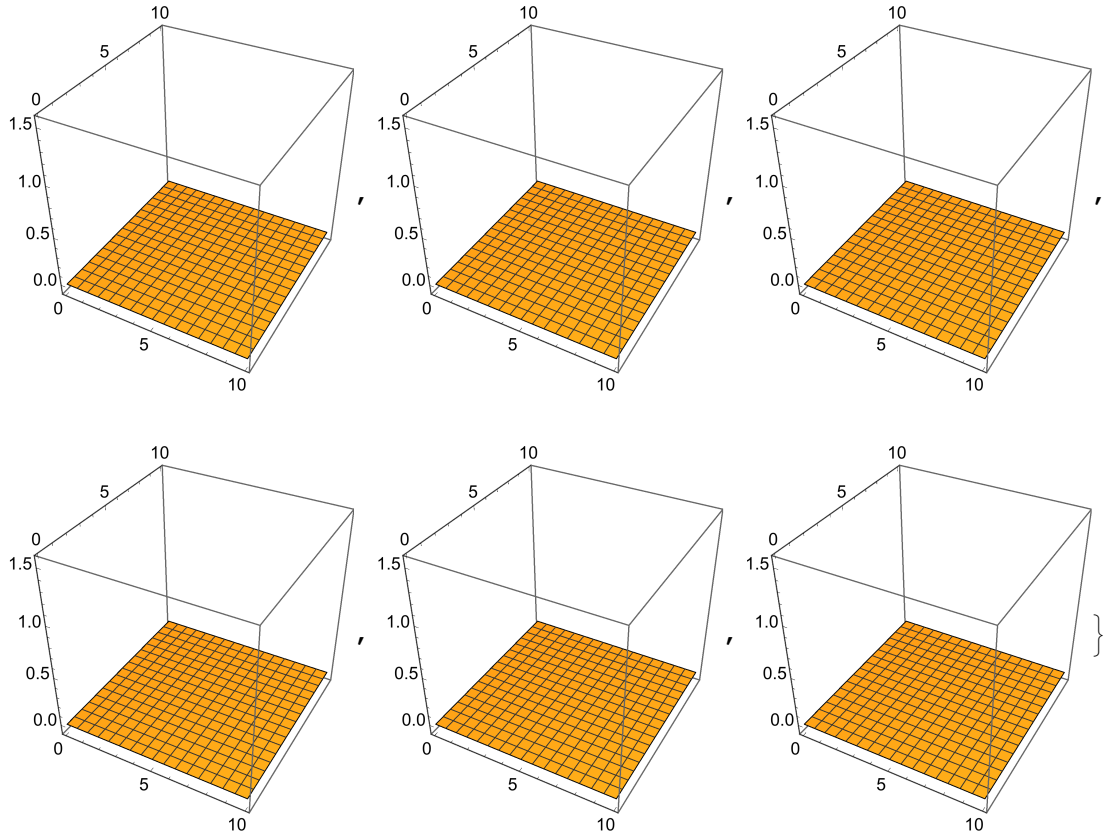
```
tplot
```

Out[360]=




10
5
0
1.5
1.0
0.5
0.0
0
5
10


10
5
0
1.5
1.0
0.5
0.0
0
5
10



In[361]:=
```
Manipulate[ContourPlot[z[x, y, t], {x, 0, L},
  {y, 0, H}, BoxRatios → {1, 1, 1}, PlotRange → {-0.1, 1.6},
  ColorFunction → "TemperatureMap", PlotPoints → 20], {t, 0, 10, .1}]
```

Out[361]=