

WE = {D[u[x, t], {t, 2}] - 1 / 25 (D[u[x, t], {x, 2}]) == 0}
[\[дифференцировать\]](#) [\[дифференцировать\]](#)

{u^(0,2)[x, t] - $\frac{1}{25}$ u^(2,0)[x, t] == 0}

bc = {u[0, t] == 0, u[1, t] == 0};

ic = {u[x, 0] == 10000 Sin[1 / 10 x (x - 1)] ^ 2,
[\[синус\]](#)

Evaluate[D[u[x, t], t] /. t -> 0] == 1000 Sin[1 / 10 x (x - 1)] ^ 2}
[\[вычислить\]](#) [\[дифференцировать\]](#) [\[синус\]](#)

{u[x, 0] == 10000 Sin $\left[\frac{1}{10} (-1 + x) x\right]^2$, u^(0,1)[x, 0] == 1000 Sin $\left[\frac{1}{10} (-1 + x) x\right]^2$ }

NDSolve[Flatten[{WE, bc, ic}], u, {x, 0, 1}, {t, 0, 1}]
[\[численн..\]](#) [\[уплостить\]](#)

NDSolve::eerr: Warning: scaled local spatial error estimate of 15.998003679035952` at t = 1.` in the direction of independent variable x is much greater than the prescribed error tolerance. Grid spacing with 25 points may be too large to achieve the desired accuracy or precision. A singularity may have formed or a smaller grid spacing can be specified using the MaxStepSize or MinPoints method options. >>

{u -> InterpolatingFunction[ Domain: {{0., 1.}, {0., 1.}} Output: scalar]] }

usol = First[u /. NDSolve[Flatten[{WE, bc, ic}], u, {x, 0, 1}, {t, 0, 1}]]
[\[первый\]](#) [\[численн..\]](#) [\[уплостить\]](#)

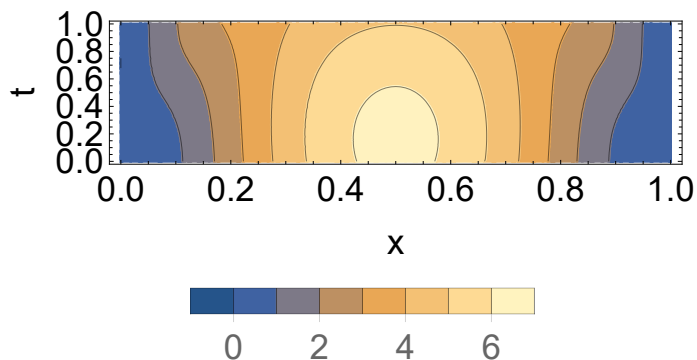
NDSolve::eerr: Warning: scaled local spatial error estimate of 15.998003679035952` at t = 1.` in the direction of independent variable x is much greater than the prescribed error tolerance. Grid spacing with 25 points may be too large to achieve the desired accuracy or precision. A singularity may have formed or a smaller grid spacing can be specified using the MaxStepSize or MinPoints method options. >>

InterpolatingFunction[ Domain: {{0., 1.}, {0., 1.}} Output: scalar]

ContourPlot[usol[x, t], {x, 0, 1}, {t, 0, 1},
[\[контурный график\]](#)

BaseStyle -> FontSize -> 22, FrameLabel -> {"x", "t"},
[\[базовый стиль\]](#) [\[размер шрифта\]](#) [\[пометка для обрамления\]](#)

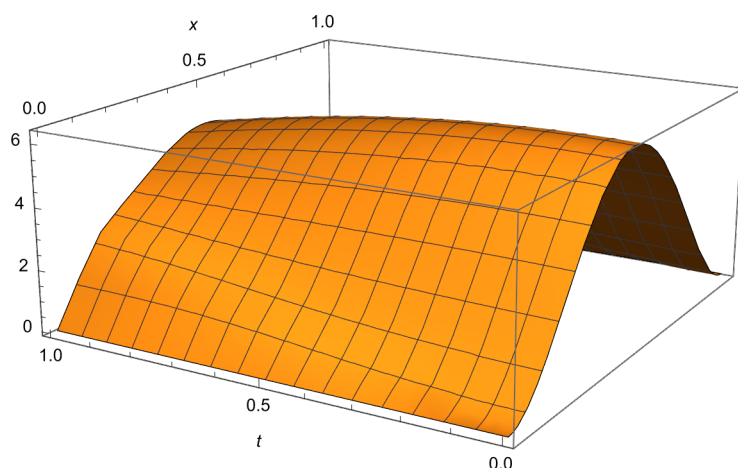
PlotLegends -> Automatic, LabelStyle -> FontSize -> 18, AspectRatio -> 1 / 4]
[\[легенды графика\]](#) [\[автоматиче..\]](#) [\[стиль отметки\]](#) [\[размер шрифта\]](#) [\[аспектное отношение\]](#)



```
Plot3D[usol[x, t], {x, 0, 1}, {t, 0, 1}, AxesLabel → {x, t}]
```

график функции 2-х переменных

обозначения на осях



```
Length[Table[i, {i, 0, 1, 1 / 10}]]
```

длина таблица значений

11

```
For[gridres = 10, gridres < 110, gridres += 10,
```

цикл для

```
  grid = Table[t, {t, 0, 1, 1 / gridres}];
```

таблица значений

```
  tab = Table[usol[x, t], {x, grid}, {t, grid}] ×
```

таблица значений

```
  SetDirectory[NotebookDirectory[]];
```

задать рабочую... директорию файла блокнота

```
  Export[StringJoin["wolfram_sln/", "wave_sln_", ToString[gridres], ".csv"], tab]
```

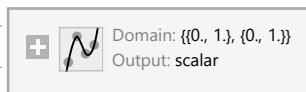
экспорт... соединить строки

преобразовать в строку

```
]
```

```
usol[x, t][0]
```

```
InterpolatingFunction[
```



```
][x, t][0]
```

```
grid = Table[t, {t, 0, 1, 1 / 10}];
```

[\[таблица значений\]](#)

```
tab = Table[usol[x, t], {x, grid}, {t, grid}]
```

[\[таблица значений\]](#)

```
{ {0., 0., 0., 0., 0., 0., 0., 0., 0., 0., -1.11022 × 10-16, 0.},
  {0.809978, 0.836287, 0.90013, 1.00368, 1.14566, 1.31729, 1.50101,
    1.67308, 1.81071, 1.89986, 1.94001}, {2.55978, 2.58701, 2.61767,
    2.65238, 2.69211, 2.73836, 2.79329, 2.85957, 2.93926, 3.03163, 3.13032},
  {4.40935, 4.44298, 4.45587, 4.44836, 4.42119, 4.37555, 4.31297, 4.23543,
    4.14528, 4.04537, 3.93905}, {5.75889, 5.79876, 5.8034, 5.77296,
    5.70804, 5.60968, 5.47927, 5.31864, 5.13002, 4.91604, 4.67975},
  {6.2487, 6.29105, 6.29334, 6.25565, 6.17856, 6.06303, 5.91042, 5.7225,
    5.50146, 5.24987, 4.97074}, {5.75889, 5.79876, 5.8034, 5.77296,
    5.70804, 5.60968, 5.47927, 5.31864, 5.13002, 4.91604, 4.67975},
  {4.40935, 4.44298, 4.45587, 4.44836, 4.42119, 4.37555, 4.31297, 4.23543,
    4.14528, 4.04537, 3.93905}, {2.55978, 2.58701, 2.61767, 2.65238,
    2.69211, 2.73836, 2.79329, 2.85957, 2.93926, 3.03163, 3.13032},
  {0.809978, 0.836287, 0.90013, 1.00368, 1.14566, 1.31729, 1.50101, 1.67308,
    1.81071, 1.89986, 1.94001}, {0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0.}}
```

```
Table[usol[x, t], {x, grid}, {t, 1}]
```

[\[таблица значений\]](#)

```
{ {0.}, {1.94001}, {3.13032}, {3.93905}, {4.67975},
  {4.97074}, {4.67975}, {3.93905}, {3.13032}, {1.94001}, {0.}}
```