

Integrazione dell'equazione KdV

Marcello Colozzo - <http://www.extrabyte.info>

(*direttive grafiche*)

```
In[1]:= SetOptions[
  {
    Plot,
    Plot3D
  },
  AxesStyle -> Directive[
    Hue[5 / 6],
    8
  ]
];
```

In[1]:= (*dati iniziali*)

In[2]:= x0 = 25; t1 = 15;

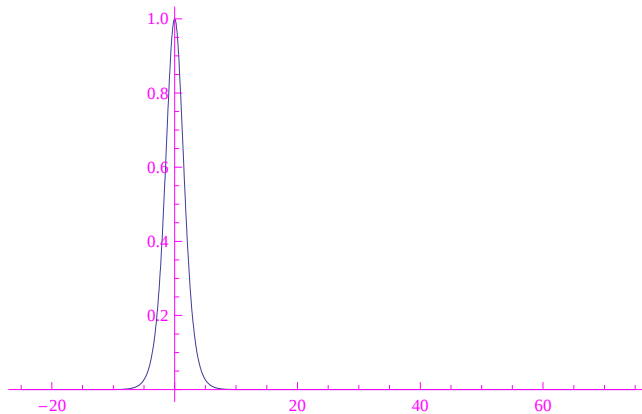
In[3]:= (*profilo iniziale*)

In[3]:= $\psi_0[x_] := \frac{1}{\cosh\left[\frac{x}{2}\right]^2}$

In[4]:= (*grafico del profilo iniziale*)

```
In[4]:= Plot[
   $\psi_0[x]$ ,
  {x, -x0, 3 x0},
  PlotRange -> All
]
```

Out[4]=



In[10]:= (*condizioni sul bordo*)

In[5]:= bordo = { $\psi[x, 0] == \psi_0[x]$, $\psi[-x_0, t] == \psi[3 * x_0, t]$ };

In[11]:= (*equazione d'onda kdV*)

In[6]:= $\text{kdv} = D[\psi[x, t], t] + D[\psi[x, t], \{x, 3\}] + 3 \psi[x, t] D[\psi[x, t], x] == 0;$

```
In[7]:= sk = NDSolve[
  {
    kdv,
    bordo
  },
   $\psi$ ,
  {x, -x0, 3 * x0},
  {t, 0, t1}
]
```

```
Out[7]= {{ $\psi$  → InterpolatingFunction[{{-25., 75.}, {0., 15.}}, <>]}}
```

```
In[8]:=  $\psi$ sol[x_, t_] =  $\psi$ [x, t] /. sk[[1]]
```

```
Out[8]= InterpolatingFunction[{{-25., 75.}, {0., 15.}}, <>][x, t]
```

```
In[9]:= Plot3D[
   $\psi$ sol[x, t],
  {x, -x0, 3 * x0},
  {t, 0, t1},
  PlotRange → All,
  PlotPoints → 100,
  Mesh → False,
  Boxed → False
]
```

