Analisi dinamica di un telaio shear-type a 3 piani

Sezione pilastri 30 x 30

Versione per la stampa

■ Comandi di utilità

■ Equazioni del moto

```
In[7]:=  eq[1] = m[1] x[1]''[t] + k[1] (x[1][t] - xg[t]) -
           k[2] (x[2][t] - x[1][t]) + c[1] (x[1]'[t] - xg'[t]) - c[2] (x[2]'[t] - x[1]'[t])

Out[7]=  k[1] (-xg[t] + x[1][t]) - k[2] (-x[1][t] + x[2][t]) +
          c[1] (-xg′[t] + x[1]′[t]) - c[2] (-x[1]′[t] + x[2]′[t]) + m[1] x[1]″[t]

In[8]:=  eq[2] = m[2] x[2]''[t] + k[2] (x[2][t] - x[1][t]) -
           k[3] (x[3][t] - x[2][t]) + c[2] (x[2]'[t] - x[1]'[t]) - c[3] (x[3]'[t] - x[2]'[t])

Out[8]=  k[2] (-x[1][t] + x[2][t]) - k[3] (-x[2][t] + x[3][t]) +
          c[2] (-x[1]′[t] + x[2]′[t]) - c[3] (-x[2]′[t] + x[3]′[t]) + m[2] x[2]″[t]

In[9]:=  eq[3] = m[3] x[3]''[t] + k[3] (x[3][t] - x[2][t]) + c[3] (x[3]'[t] - x[2]'[t])

Out[9]=  k[3] (-x[2][t] + x[3][t]) + c[3] (-x[2]′[t] + x[3]′[t]) + m[3] x[3]″[t]

In[10]:=  MM := Table[Coefficient[eq[i], x[j]''[t]], {i, 1, 3}, {j, 1, 3}]

In[11]:=  KK := Table[Coefficient[eq[i], x[j][t]], {i, 1, 3}, {j, 1, 3}]

In[12]:=  CC := Table[Coefficient[eq[i], x[j]'[t]], {i, 1, 3}, {j, 1, 3}]

In[13]:=  FF1 := Table[Coefficient[eq[i], xg[t]], {i, 1, 3}]

In[14]:=  FF2 := Table[Coefficient[eq[i], xg'[t]], {i, 1, 3}]

In[15]:=  MatrixForm[MM]

Out[15]//MatrixForm=
```

$$\begin{pmatrix} m[1] & 0 & 0 \\ 0 & m[2] & 0 \\ 0 & 0 & m[3] \end{pmatrix}$$

```
In[16]:=  MatrixForm[KK]

Out[16]//MatrixForm=
```

$$\begin{pmatrix} k[1]+k[2] & -k[2] & 0 \\ -k[2] & k[2]+k[3] & -k[3] \\ 0 & -k[3] & k[3] \end{pmatrix}$$

```
In[17]:=  MatrixForm[CC]

Out[17]//MatrixForm=
```

$$\begin{pmatrix} c[1]+c[2] & -c[2] & 0 \\ -c[2] & c[2]+c[3] & -c[3] \\ 0 & -c[3] & c[3] \end{pmatrix}$$

In[18]:= **AA := Inverse[MM].KK**

In[19]:= **MatrixForm[AA]**

Out[19]//MatrixForm=

$$\begin{pmatrix} \frac{k[1]+k[2]}{m[1]} & -\frac{k[2]}{m[1]} & 0 \\ -\frac{k[2]}{m[2]} & \frac{k[2]+k[3]}{m[2]} & -\frac{k[3]}{m[2]} \\ 0 & -\frac{k[3]}{m[3]} & \frac{k[3]}{m[3]} \end{pmatrix}$$

In[20]:= **Table[m[i] = M, {i, 1, 3}]**

Out[20]= {M, M, M}

In[21]:= **Table[k[i] = K, {i, 1, 3}]**

Out[21]= {K, K, K}

In[22]:= **Table[c[i] = Ci, {i, 1, 3}]**

Out[22]= {Ci, Ci, Ci}

In[23]:= **AA**

Out[23]= $\left\{\left\{\frac{2K}{M}, -\frac{K}{M}, 0\right\}, \left\{-\frac{K}{M}, \frac{2K}{M}, -\frac{K}{M}\right\}, \left\{0, -\frac{K}{M}, \frac{K}{M}\right\}\right\}$

In[24]:= **MatrixForm[AA]**

Out[24]//MatrixForm=

$$\begin{pmatrix} \frac{2K}{M} & -\frac{K}{M} & 0 \\ -\frac{K}{M} & \frac{2K}{M} & -\frac{K}{M} \\ 0 & -\frac{K}{M} & \frac{K}{M} \end{pmatrix}$$

■ Assegnazione valori numerici

In[25]:= **l = 3;**

In[26]:= **b = 0.3;**

In[27]:= **h = 0.3;**

In[28]:= **Ine =** $\frac{b\,h^3}{12}$

Out[28]= 0.000675

In[29]:= **El =** $3\,10^{10}$

Out[29]= 30000000000

In[30]:= **K =** $\frac{24\,El\,Ine}{l^3}$

Out[30]= 1.8×10^7

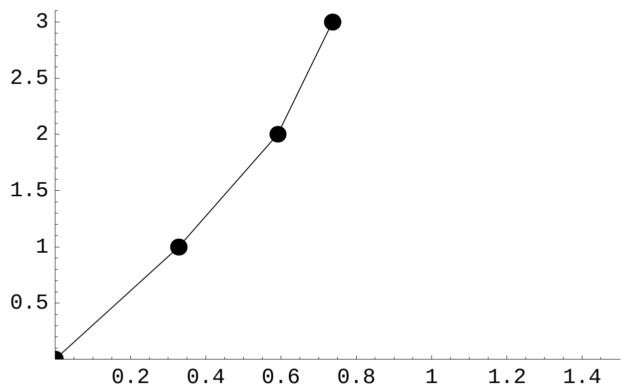
In[31]:= **M = 25000**

Out[31]= 25000

```
In[32]:= Ci = .02

Out[32]= 0.02
```

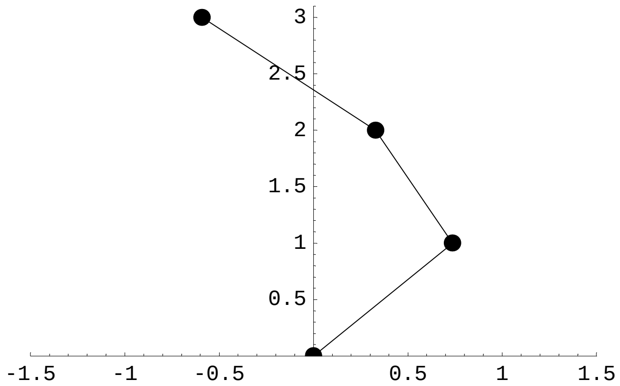
■ Analisi modale

```
In[33]:= AA

Out[33]= {{1440., -720., 0.}, {-720., 1440., -720.}, {0., -720., 720.}}

In[34]:= eigens = Eigensystem[AA]

Out[34]= {{2337.83, 1119.57, 142.605}, {{-0.591009, 0.736976, -0.327985},
           {0.736976, 0.327985, -0.591009}, {0.327985, 0.591009, 0.736976}}}

In[35]:= eigv1 = eigens[[2, 3]]

Out[35]= {0.327985, 0.591009, 0.736976}

In[36]:= eigv2 = eigens[[2, 2]]

Out[36]= {0.736976, 0.327985, -0.591009}

In[37]:= eigv3 = eigens[[2, 1]]

Out[37]= {-0.591009, 0.736976, -0.327985}

In[38]:= avet[1] = AppendColumns[{{0, 0}}, Table[{eigv1[[i]], i}, {i, 1, 3}]]

Out[38]= {{0, 0}, {0.327985, 1}, {0.591009, 2}, {0.736976, 3}}

In[39]:= plmodol[1] = ListPlot[avet[1], PlotJoined → True,
           PlotRange → {{0, 1.5}, {0, 3.1}}, DisplayFunction → Identity]

Out[39]= - Graphics -

In[40]:= plmodop[1] = ListPlot[avet[1], PlotStyle → PointSize[0.03],
            PlotRange → {{0, 1.5}, {0, 3.1}}, DisplayFunction → Identity];

In[41]:= Show[plmodol[1], plmodop[1], DisplayFunction → $DisplayFunction]
```

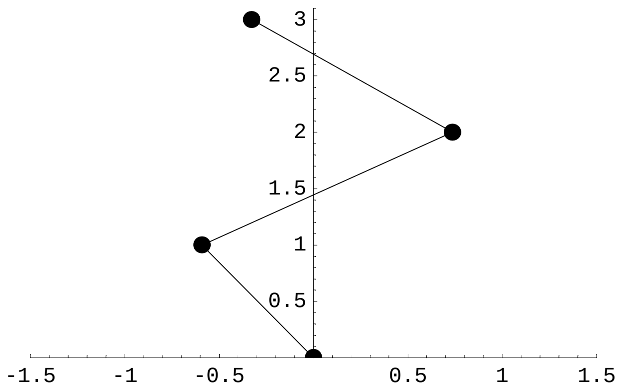



```
Out[41]= - Graphics -

In[42]:= avet[2] = AppendColumns[{{0, 0}}, Table[{eigv2[[i]], i}, {i, 1, 3}]]

Out[42]= {{0, 0}, {0.736976, 1}, {0.327985, 2}, {-0.591009, 3}}
```

```
In[43]:= plmodol[2] = ListPlot[avet[2], PlotJoined → True,
           PlotRange → {{-1.5, 1.5}, {0, 3.1}}, DisplayFunction → Identity]

Out[43]= - Graphics -

In[44]:= plmodop[2] = ListPlot[avet[2], PlotStyle → PointSize[0.03],
           PlotRange → {{0, 1.5}, {0, 3.1}}, DisplayFunction → Identity]

Out[44]= - Graphics -

In[45]:= Show[plmodol[2], plmodop[2], DisplayFunction → $DisplayFunction]
```




```
Out[45]= - Graphics -

In[46]:= avet[3] = AppendColumns[{{0, 0}}, Table[{eigv3[[i]], i}, {i, 1, 3}]]

Out[46]= {{0, 0}, {-0.591009, 1}, {0.736976, 2}, {-0.327985, 3}}

In[47]:= plmodol[3] = ListPlot[avet[3], PlotJoined → True,
           PlotRange → {{-1.5, 1.5}, {0, 3.1}}, DisplayFunction → Identity]

Out[47]= - Graphics -

In[48]:= plmodop[3] = ListPlot[avet[3], PlotStyle → PointSize[0.03],
           PlotRange → {{0, 1.5}, {0, 3.1}}, DisplayFunction → Identity]

Out[48]= - Graphics -

In[49]:= Show[plmodol[3], plmodop[3], DisplayFunction → $DisplayFunction]
```




```
Out[49]= - Graphics -
```

```
In[50]:= Φ = Transpose[{eigv1, eigv2, eigv3}]

Out[50]= {{0.327985, 0.736976, -0.591009},
          {0.591009, 0.327985, 0.736976}, {0.736976, -0.591009, -0.327985}}

In[51]:= MatrixForm[Φ]

Out[51]//MatrixForm=
```

$$\begin{pmatrix} 0.327985 & 0.736976 & -0.591009 \\ 0.591009 & 0.327985 & 0.736976 \\ 0.736976 & -0.591009 & -0.327985 \end{pmatrix}$$

```
In[52]:= MatrixForm[KK]

Out[52]//MatrixForm=
```

$$\begin{pmatrix} 3.6\times10^{7} & -1.8\times10^{7} & 0 \\ -1.8\times10^{7} & 3.6\times10^{7} & -1.8\times10^{7} \\ 0 & -1.8\times10^{7} & 1.8\times10^{7} \end{pmatrix}$$

In[53]:= **kmodal = Chop[Transpose[Φ].KK.Φ, 10^{-6}]**

Out[53]= $\{\{3.56512\times10^{6}, 0, 0\}, \{0, 2.79892\times10^{7}, 0\}, \{0, 0, 5.84456\times10^{7}\}\}$

```
In[54]:= MatrixForm[kmodal]

Out[54]//MatrixForm=
```

$$\begin{pmatrix} 3.56512\times10^{6} & 0 & 0 \\ 0 & 2.79892\times10^{7} & 0 \\ 0 & 0 & 5.84456\times10^{7} \end{pmatrix}$$

In[55]:= **mmodal = Chop[Transpose[Φ].MM.Φ, 10^{-6}]**

```
Out[55]= {{25000., 0, 0}, {0, 25000., 0}, {0, 0, 25000.}}

In[56]:= MatrixForm[mmodal]

Out[56]//MatrixForm=
```

$$\begin{pmatrix} 25000. & 0 & 0 \\ 0 & 25000. & 0 \\ 0 & 0 & 25000. \end{pmatrix}$$

```
In[57]:= Y[t] = {y[1][t], y[2][t], y[3][t]}

Out[57]= {y[1][t], y[2][t], y[3][t]}

In[58]:= CC

Out[58]= {{0.04, -0.02, 0}, {-0.02, 0.04, -0.02}, {0, -0.02, 0.02}}
```

In[59]:= **cmodal = Chop[Transpose[Φ].CC.Φ, 10^{-6}]**

Out[59]= {{0.00396125, 0, 0}, {0, 0.0310992, 0}, {0, 0, 0.0649396}}

In[60]:= **fmodal1 = Chop[Transpose[Φ].FF1, 10^{-6}]**

Out[60]= $\{-5.90373\times10^{6}, -1.32656\times10^{7}, 1.06382\times10^{7}\}$

In[61]:= **fmodal2 = Chop[Transpose[Φ].FF2, 10^{-6}]**

Out[61]= {-0.00655971, -0.0147395, 0.0118202}

Equazioni modali

```
In[62]:= eqdisacc = mmodal.D[Y[t], {t, 2}] + kmodal.Y[t] +
           cmodal.D[Y[t], {t, 1}] + fmodal1 xg[t] + fmodal2 xg'[t]
```

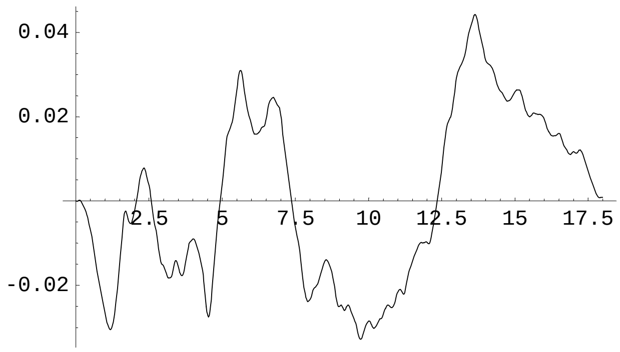
Out[62]= $\{-5.90373\times 10^6\,xg[t] + 3.56512\times 10^6\,y[1][t] - 0.00655971\,xg'[t] + 0.00396125\,y[1]'[t] + 25000.\,y[1]''[t],$
$-1.32656\times 10^7\,xg[t] + 2.79892\times 10^7\,y[2][t] - 0.0147395\,xg'[t] + 0.0310992\,y[2]'[t] + 25000.\,y[2]''[t],\ 1.06382\times 10^7\,xg[t] + 5.84456\times 10^7\,y[3][t] + 0.0118202\,xg'[t] + 0.0649396\,y[3]'[t] + 25000.\,y[3]''[t]\}$

■ Assegnazione terremoto

```
In[63]:= terr = << taftdis2;

In[64]:= terr1 =
           Block[{t = -0.01, Δt = 0.01}, Table[{t = t + Δt, terr[[i]]}, {i, 1, Length[terr]}]];

In[65]:= xg = Interpolation[terr1]

Out[65]= InterpolatingFunction[{{0., 17.99}}, <>]
```

Spostamento al terreno

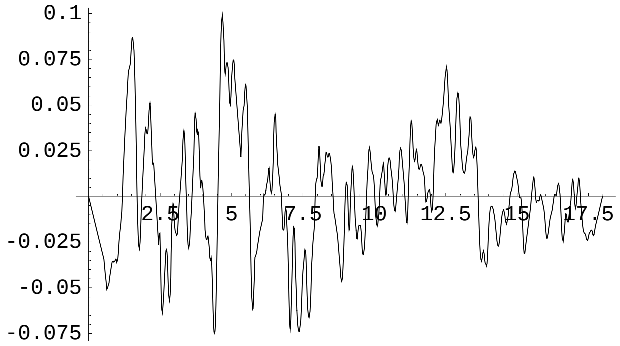
```
In[66]:= Plot[Evaluate[xg[t]], {t, 0, 17.99}]
```




```
Out[66]= - Graphics -
```

Velocità al terreno

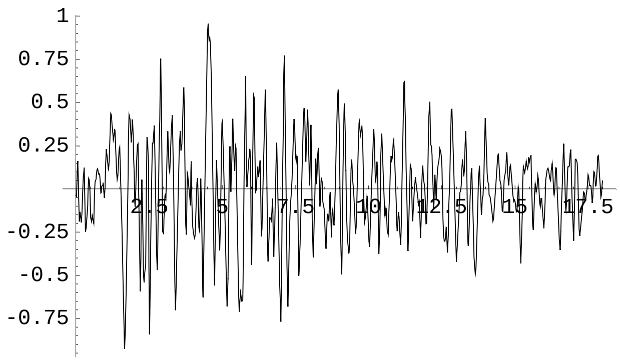
```
In[67]:= Plot[Evaluate[xg'[t]], {t, 0, 17.99}]
```




```
Out[67]= - Graphics -
```

Accelerazione al terreno

```
In[68]:= Plot[Evaluate[xg''[t]], {t, 0, 17.99}]
```



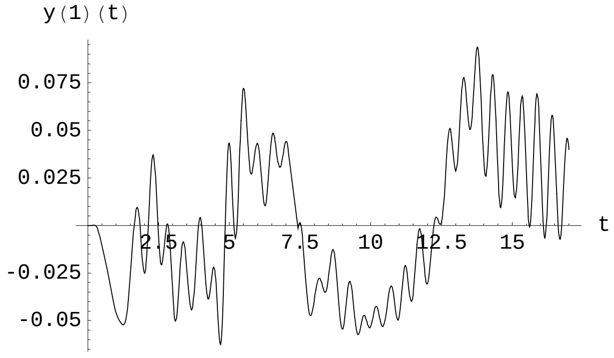

```
Out[68]= - Graphics -
```

■ Risoluzione equazioni modali

Soluzione prima equazione modale

```
In[69]:= mod[1] = NDSolve[{eqdisacc[[1]] == 0, y[1][0] == 0, y[1]'[0] == 0},
           y[1], {t, 17}, MaxSteps → maxpassi]

Out[69]= {{y[1] → InterpolatingFunction[{{0., 17.}}, <>]}}
```

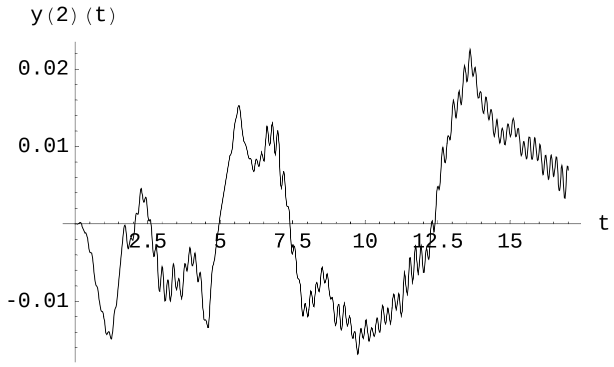
```
In[70]:= Plot[Evaluate[y[1][t] /. mod[1]], {t, 0, 17}, AxesLabel → {"t", "y(1)(t)"}]
```




```
Out[70]= - Graphics -
```

Soluzione seconda equazione modale

```
In[71]:= mod[2] = NDSolve[{eqdisacc[[2]] == 0, y[2][0] == 0, y[2]'[0] == 0},
           y[2], {t, 0, 17}, MaxSteps → maxpassi]

Out[71]= {{y[2] → InterpolatingFunction[{{0., 17.}}, <>]}}

In[72]:= Plot[Evaluate[y[2][t] /. mod[2]], {t, 0, 17}, AxesLabel → {"t", "y(2)(t)"}]
```

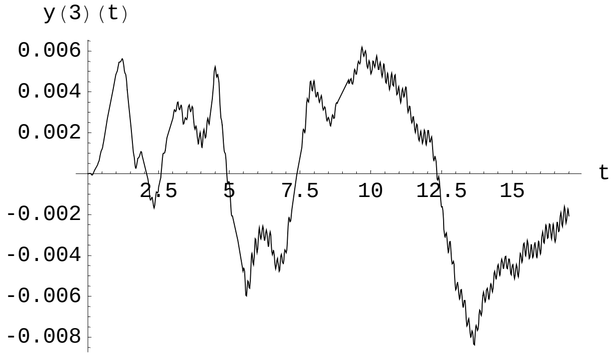



```
Out[72]= - Graphics -
```

Soluzione terza equazione modale

```
In[73]:= mod[3] = NDSolve[{eqdisacc[[3]] == 0, y[3][0] == 0, y[3]'[0] == 0},
           y[3], {t, 0, 17}, MaxSteps → maxpassi]

Out[73]= {{y[3] → InterpolatingFunction[{{0., 17.}}, <>]}}
```

```
In[74]:= Plot[Evaluate[y[3][t] /. mod[3]], {t, 0, 17}, AxesLabel → {"t", "y(3)(t)"}]
```



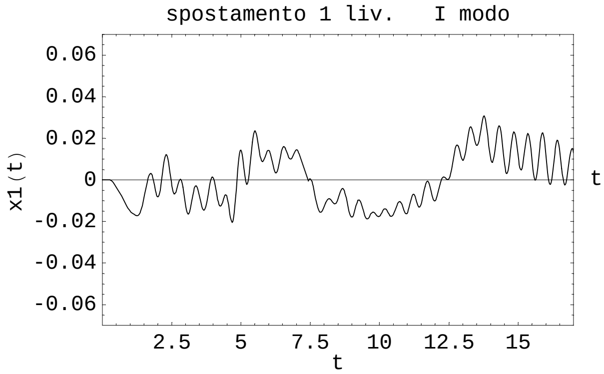

```
Out[74]= - Graphics -
```

Ricostruzione dello stato

```
In[75]:= Φ.{y[1], y[2], y[3]}

Out[75]= {0.327985 y[1] + 0.736976 y[2] - 0.591009 y[3],
          0.591009 y[1] + 0.327985 y[2] + 0.736976 y[3],
          0.736976 y[1] - 0.591009 y[2] - 0.327985 y[3]}
```

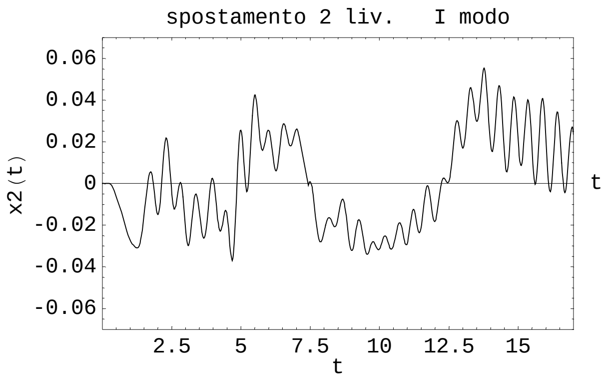
■ Stato con il solo primo modo

```
In[76]:= pl1x1 = Plot[Evaluate[(Φ[[1, 1]] y[1][t] /. mod[1])], {t, 0, 17},
           PlotRange → {{0, 17}, {-estrgraf, estrgraf}}, AxesLabel → {"t", "x1(t)"},
           Frame → True, FrameLabel → {"t", "x1(t)", "spostamento 1 liv.   I modo", " "}]
```



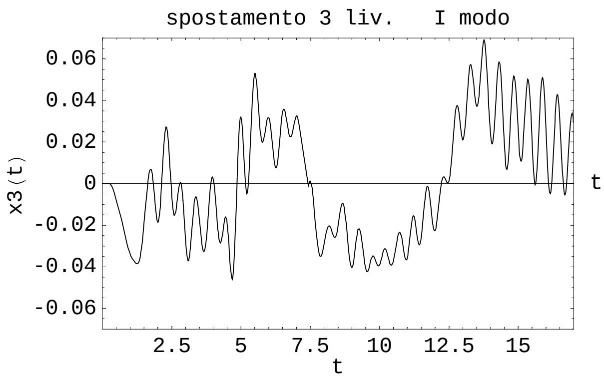

```
Out[76]= - Graphics -
```

```
In[77]:= pl1x2 = Plot[Evaluate[(Φ[[2, 1]] y[1][t] /. mod[1])], {t, 0, 17},
           PlotRange → {{0, 17}, {-estrgraf, estrgraf}}, AxesLabel → {"t", "x2(t)"},
           Frame → True, FrameLabel → {"t", "x2(t)", "spostamento 2 liv.    I modo", " "}]
```




```
Out[77]= - Graphics -
```

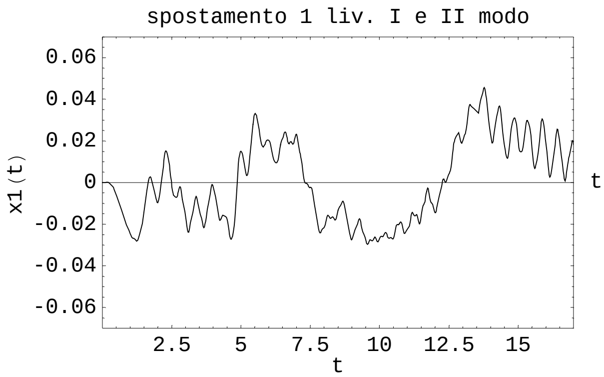
```
In[78]:= pl1x3 = Plot[Evaluate[(Φ[[3, 1]] y[1][t] /. mod[1])], {t, 0, 17},
           PlotRange → {{0, 17}, {-estrgraf, estrgraf}}, AxesLabel → {"t", "x3(t)"},
           Frame → True, FrameLabel → {"t", "x3(t)", "spostamento 3 liv.    I modo", " "}]
```




```
Out[78]= - Graphics -
```

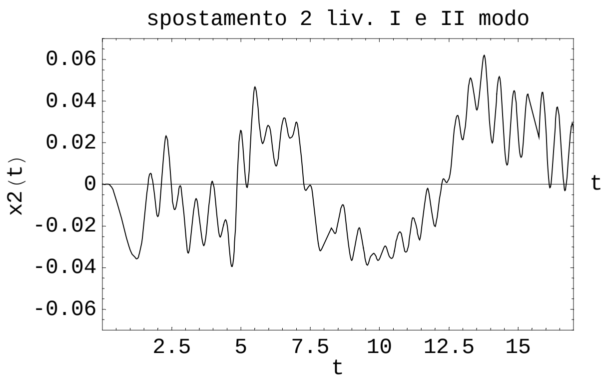
■ Stato con i primi due modi

In[79]:=
```
pl2x1 = Plot[Evaluate[(Φ[[1, 1]] y[1][t] /. mod[1]) + (Φ[[1, 2]] y[2][t] /. mod[2])],
  {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
  AxesLabel → {"t", "x1(t)"}, Frame → True,
  FrameLabel → {"t", "x1(t)", "spostamento 1 liv. I e II modo", " "}]
```



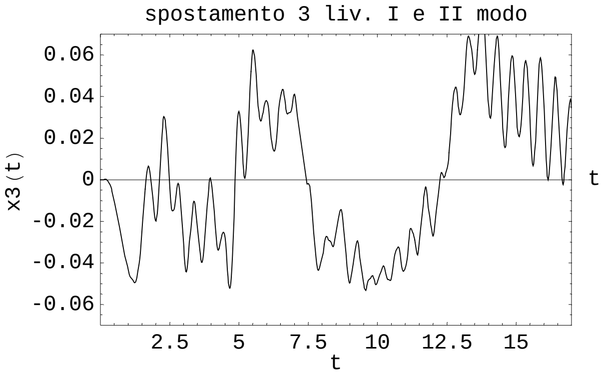
Out[79]= - Graphics -

In[80]:=
```
pl2x2 = Plot[Evaluate[(Φ[[2, 1]] y[1][t] /. mod[1]) + (Φ[[2, 2]] y[2][t] /. mod[2])],
  {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
  AxesLabel → {"t", "x2(t)"}, Frame → True,
  FrameLabel → {"t", "x2(t)", "spostamento 2 liv. I e II modo", " "}]
```



Out[80]= - Graphics -

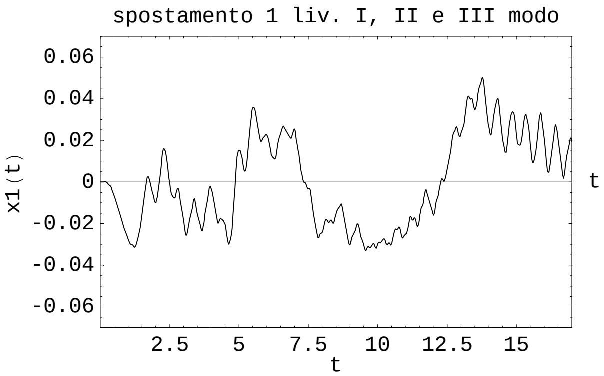
```
In[81]:= pl2x3 = Plot[Evaluate[(Φ[[3, 1]] y[1][t] /. mod[1]) + (Φ[[3, 1]] y[2][t] /. mod[2])],
           {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
           AxesLabel → {"t", "x3(t)"}, Frame → True,
           FrameLabel → {"t", "x3(t)", "spostamento 3 liv. I e II modo", " "}]
```




```
Out[81]= - Graphics -
```

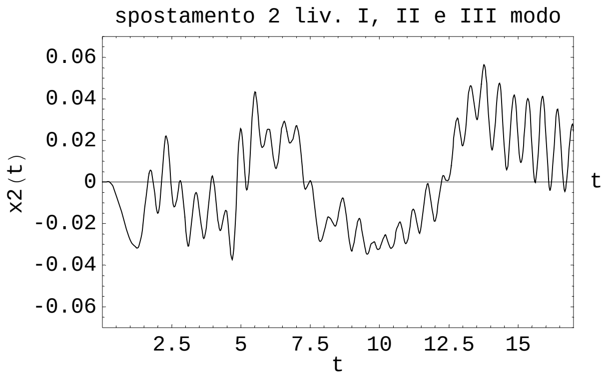
■ Stato con tutti e tre i modi

```
In[82]:= pl3x1 = Plot[Evaluate[(Φ[[1, 1]] y[1][t] /. mod[1]) +
             (Φ[[1, 2]] y[2][t] /. mod[2]) + (Φ[[1, 3]] y[3][t] /. mod[3])],
           {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
           AxesLabel → {"t", "x1(t)"}, Frame → True,
           FrameLabel → {"t", "x1(t)", "spostamento 1 liv. I, II e III modo", " "}]
```



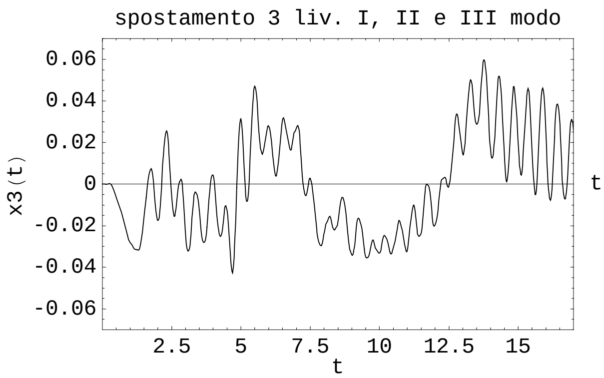

```
Out[82]= - Graphics -
```

```
In[83]:= pl3x2 = Plot[Evaluate[(Φ[[2, 1]] y[1][t] /. mod[1]) +
            (Φ[[2, 2]] y[2][t] /. mod[2]) + (Φ[[2, 3]] y[3][t] /. mod[3])],
          {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
          AxesLabel → {"t", "x2(t)"}, Frame → True,
          FrameLabel → {"t", "x2(t)", "spostamento 2 liv. I, II e III modo", " "}]
```




```
Out[83]= - Graphics -
```

```
In[84]:= pl3x3 = Plot[Evaluate[(Φ[[3, 1]] y[1][t] /. mod[1]) +
            (Φ[[3, 2]] y[2][t] /. mod[2]) + (Φ[[3, 3]] y[3][t] /. mod[3])],
          {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
          AxesLabel → {"t", "x3(t)"}, Frame → True,
          FrameLabel → {"t", "x3(t)", "spostamento 3 liv. I, II e III modo", " "}]
```

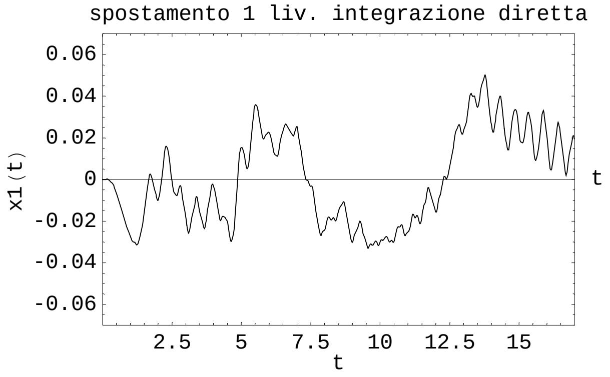



```
Out[84]= - Graphics -
```

■ Soluzione dell'equazione di partenza

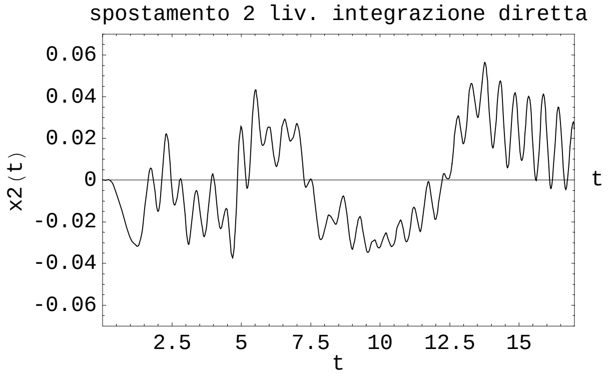
```
In[85]:= soltot = NDSolve[{eq[1] == 0, eq[2] == 0, eq[3] == 0, x[1][0] == 0,
            x[1]'[0] == 0, x[2][0] == 0, x[2]'[0] == 0, x[3][0] == 0, x[3]'[0] == 0},
          {x[1], x[2], x[3]}, {t, 0, 17}, MaxSteps → maxpassi]

Out[85]= {{x[1] → InterpolatingFunction[{{0., 17.}}, <>],
          x[2] → InterpolatingFunction[{{0., 17.}}, <>],
          x[3] → InterpolatingFunction[{{0., 17.}}, <>]}}
```

In[86]:=
```
pltotx1 = Plot[Evaluate[x[1][t] /. soltot],
  {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
  AxesLabel → {"t", "x1(t)"}, Frame → True,
  FrameLabel → {"t", "x1(t)", "spostamento 1 liv. integrazione diretta", " "}]
```



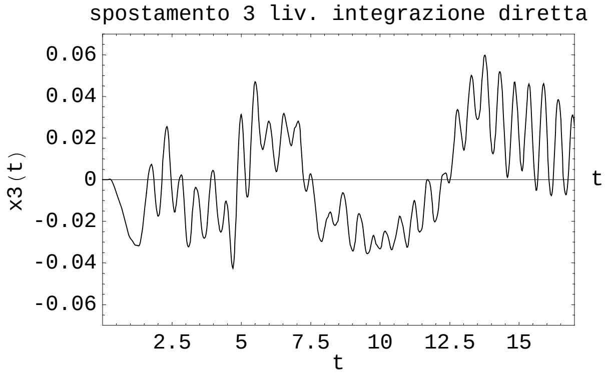
Out[86]= - Graphics -

In[87]:=
```
pltotx2 = Plot[Evaluate[x[2][t] /. soltot],
  {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
  AxesLabel → {"t", "x2(t)"}, Frame → True,
  FrameLabel → {"t", "x2(t)", "spostamento 2 liv. integrazione diretta", " "}]
```



Out[87]= - Graphics -

In[88]:=
```
pltotx3 = Plot[Evaluate[x[3][t] /. soltot],
  {t, 0, 17}, PlotRange → {{0, 17}, {-estrgraf, estrgraf}},
  AxesLabel → {"t", "x3(t)"}, Frame → True,
  FrameLabel → {"t", "x3(t)", "spostamento 3 liv. integrazione diretta", " "}]
```



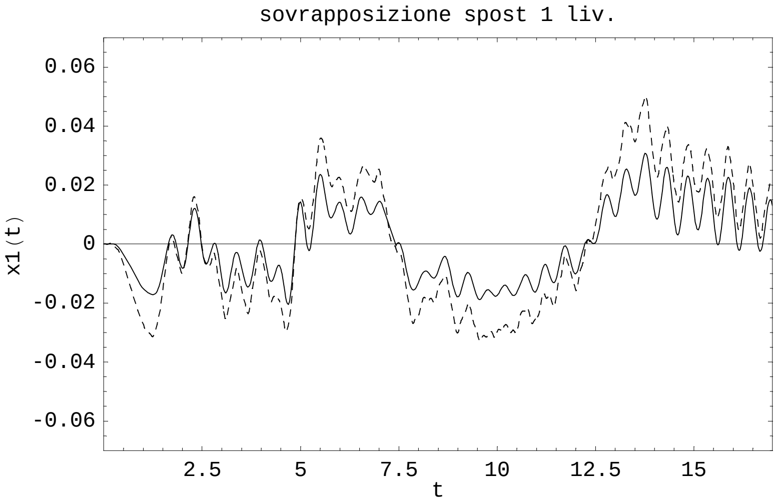
Out[88]= - Graphics -

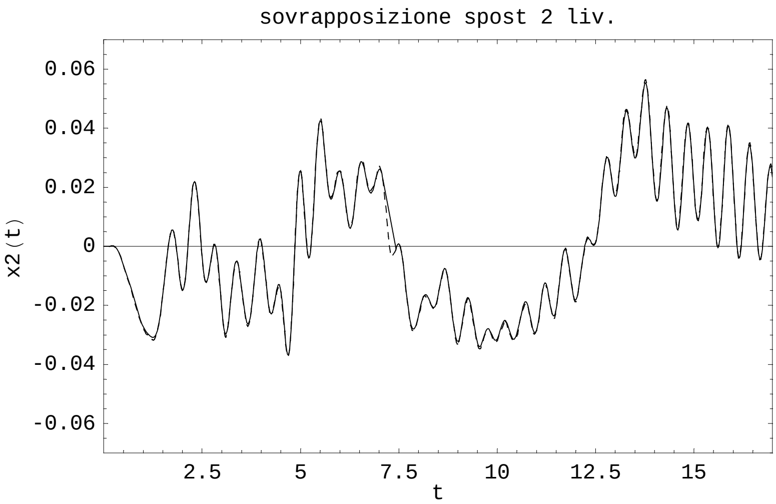
■ Sovrapposizione

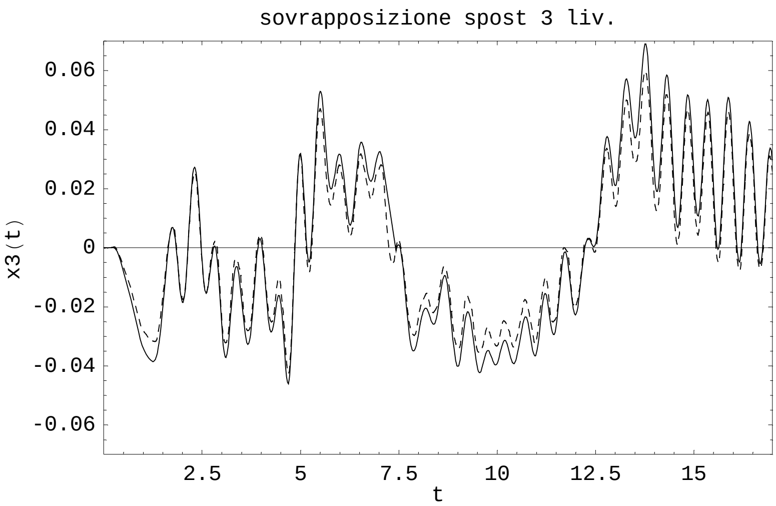
```
In[89]:= pltotx1r = Plot[Evaluate[x[1][t] /. soltot], {t, 0, 17},
           PlotRange → {{0, 17}, {-estrgraf, estrgraf}}, Frame → True,
           FrameLabel → {"t", "x1(t)", "sovrapposizione spost 1 liv.", " "},
           PlotStyle → Dashing[{0.01, 0.01}], DisplayFunction → Identity];

In[90]:= pltotx2r = Plot[Evaluate[x[2][t] /. soltot], {t, 0, 17},
           PlotRange → {{0, 17}, {-estrgraf, estrgraf}}, Frame → True,
           FrameLabel → {"t", "x2(t)", "sovrapposizione spost 2 liv.", " "},
           PlotStyle → Dashing[{0.01, 0.01}], DisplayFunction → Identity];

In[91]:= pltotx3r = Plot[Evaluate[x[3][t] /. soltot], {t, 0, 17},
           PlotRange → {{0, 17}, {-estrgraf, estrgraf}}, Frame → True,
           FrameLabel → {"t", "x3(t)", "sovrapposizione spost 3 liv.", " "},
           PlotStyle → Dashing[{0.01, 0.01}], DisplayFunction → Identity];
```

Soluzione dell'equazione di partenza e soluzione con il primo modo (a linea continua)

```
In[92]:= Show[GraphicsArray[{{Show[pltotx1r, pl1x1]}, {Show[pltotx2r, pl1x2]},
           {Show[pltotx3r, pl1x3]}}], DisplayFunction → $DisplayFunction]]
```



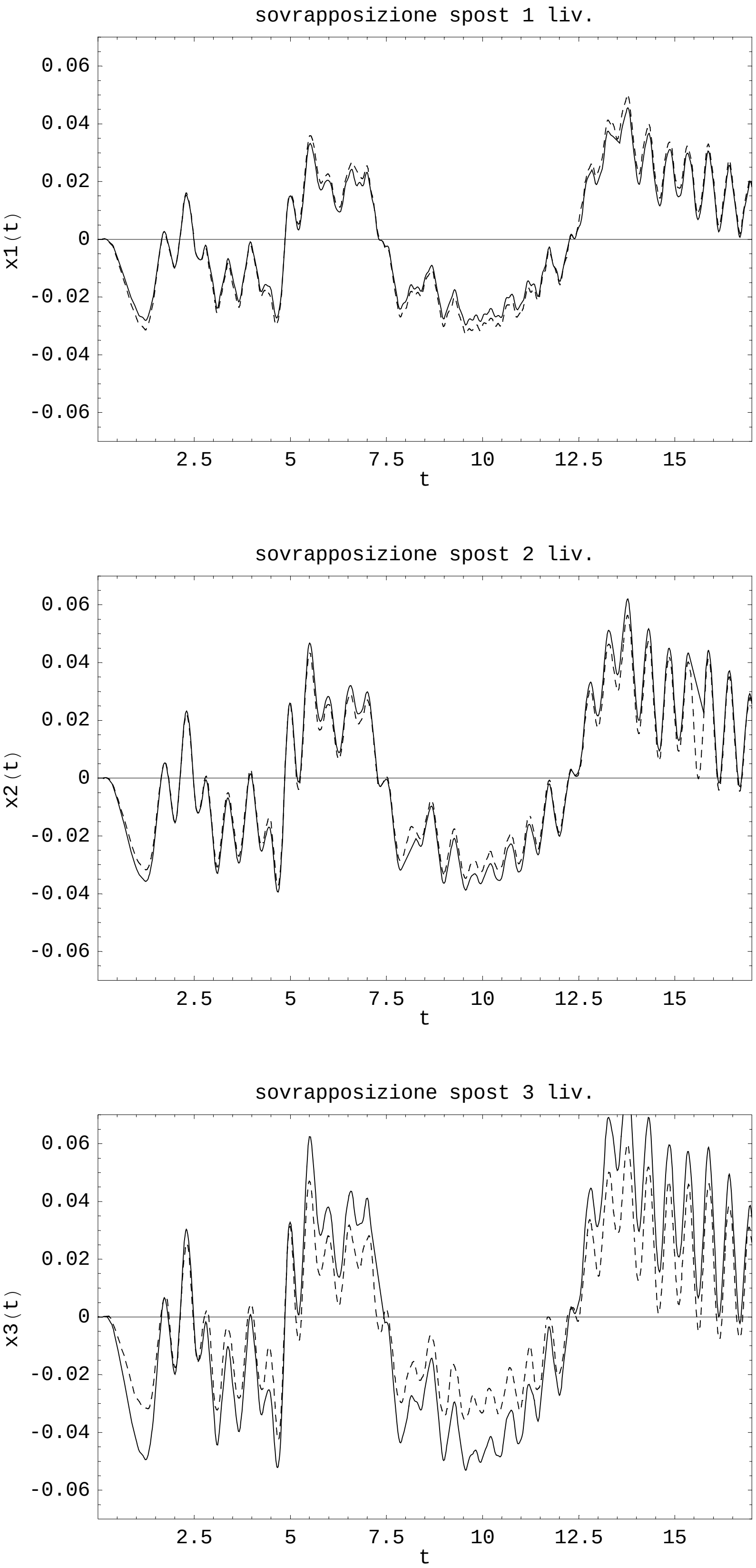





```
Out[92]= - GraphicsArray -
```

Soluzione dell'equazione di partenza e soluzione con il primo e secondo modo (a linea continua)

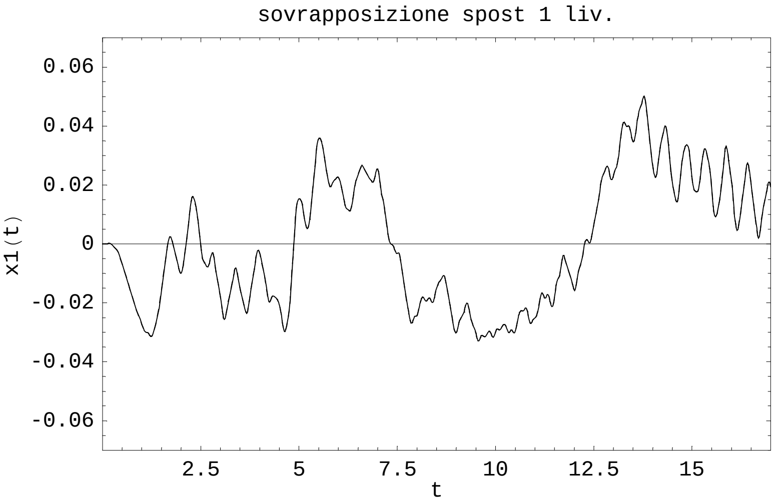
```
In[93]:= Show[GraphicsArray[{{Show[pltotx1r, pl2x1]}, {Show[pltotx2r, pl2x2]},
           {Show[pltotx3r, pl2x3]}}, DisplayFunction → $DisplayFunction]]
```

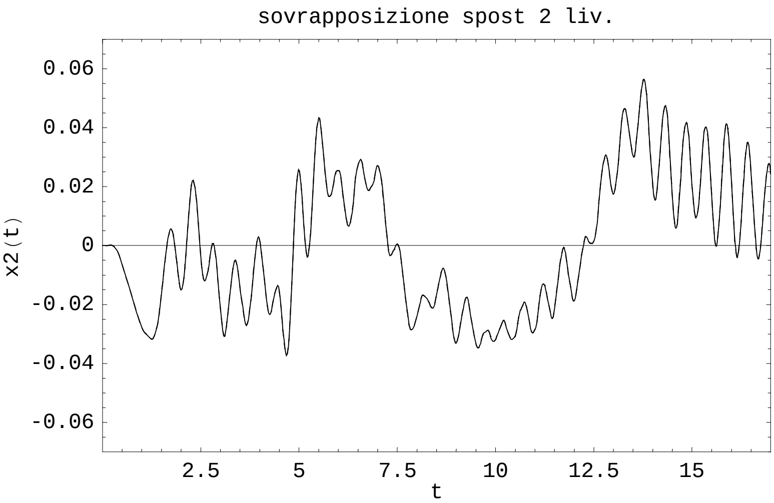


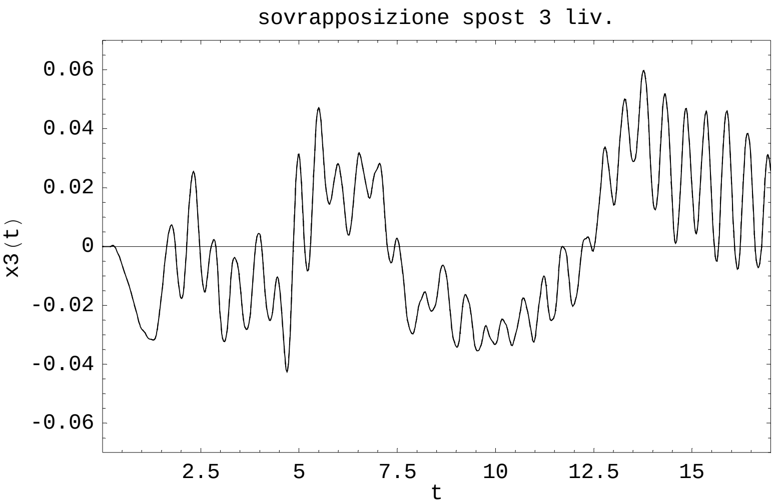
Out[93]= - GraphicsArray -

Soluzione dell'equazione di partenza e soluzione con il primo, secondo e terzo modo (a linea continua)

```
In[94]:= Show[GraphicsArray[{{Show[pltotx1r, pl3x1]}, {Show[pltotx2r, pl3x2]},
           {Show[pltotx3r, pl3x3]}}, DisplayFunction → $DisplayFunction]]
```








```
Out[94]= - GraphicsArray -
```