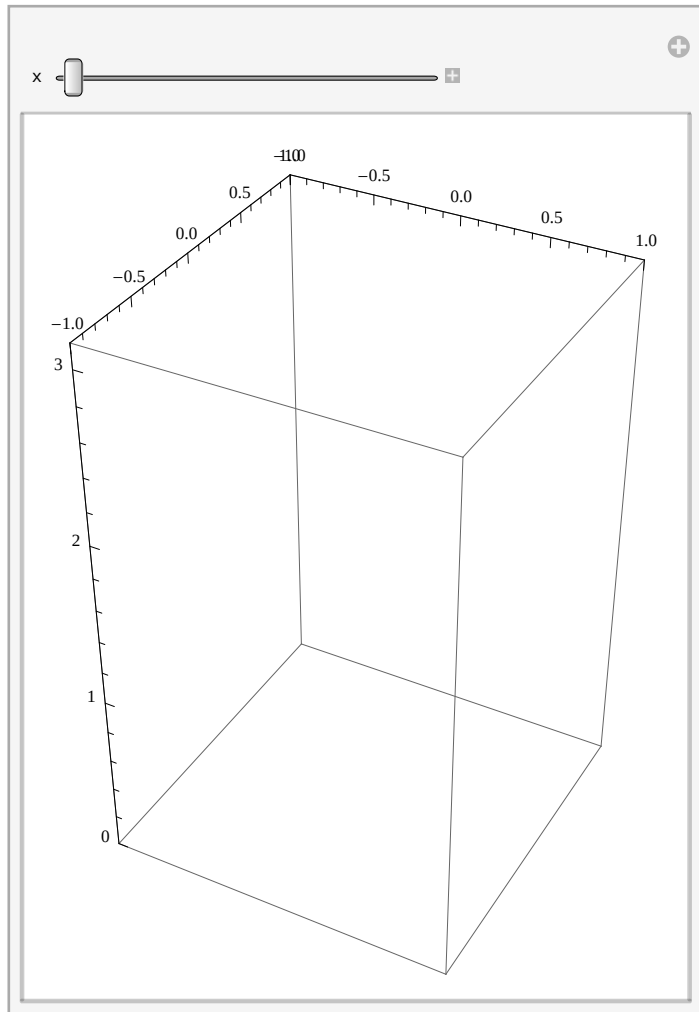
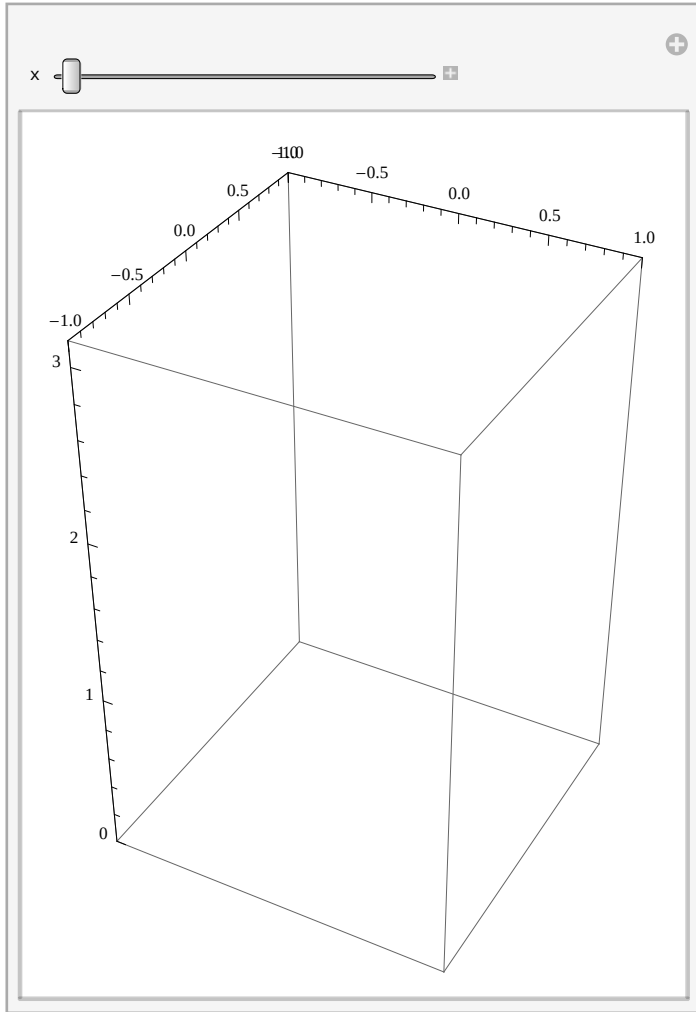


```
helix[a_, b_][t_] := {a Cos[t], a Sin[t], b * t}
```

```
Manipulate[ParametricPlot3D[helix[x, 0.35][t],  
  {t, 0, 4 Pi}, PlotRange -> {{-1, 1}, {-1, 1}, {0, Pi}}], {x, 0.25, 1}]
```



```
Manipulate[ParametricPlot3D[{helix[1, x][t], helix[0.25, x][t],  $f_z$ },
  {t, 0, 16 Pi}, PlotRange -> {{-1, 1}, {-1, 1}, {0, Pi}}, {x, 0.1, 0.35}]
```

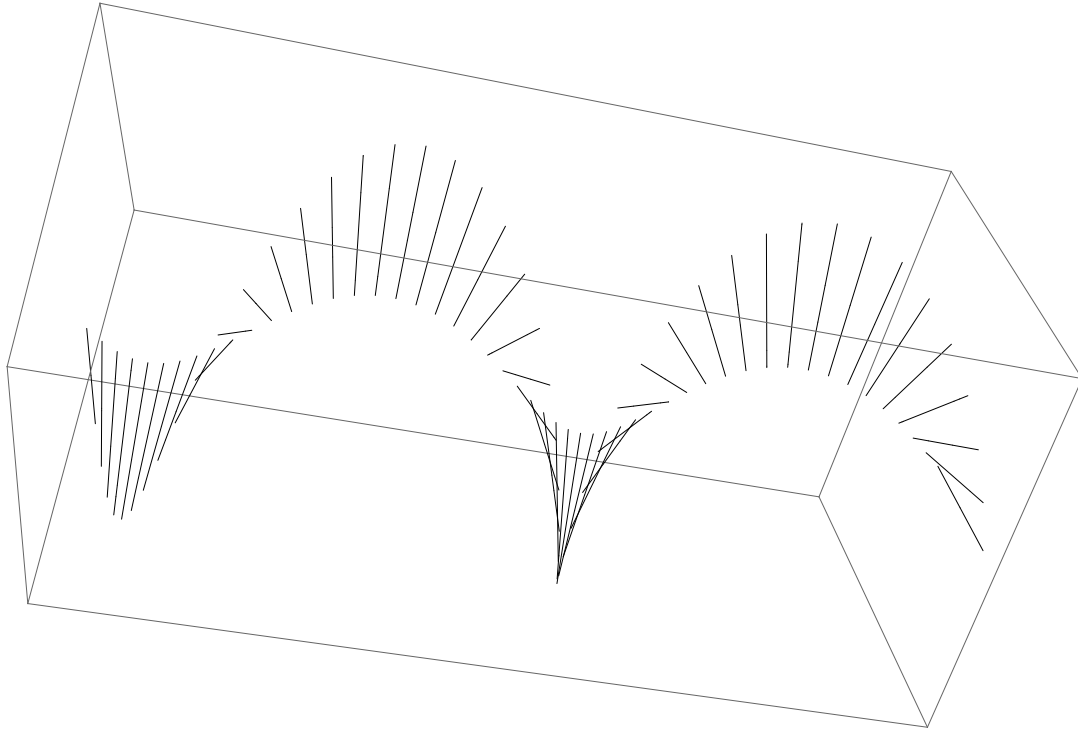


```
listept1 = Table[helix[1, 0.35][t], {t, 0, 4 Pi, .25}];
listept2 = Table[helix[0.25, 0.35][t], {t, 0, 4 Pi, .25}];
exterieurSup1 = Map[{0, 0, 0.1} + # &, listept1];
hautContrext1 = Flatten[{{listept1}, {exterieurSup1}}, 1];
ptsHautContrext1 = Transpose[hautContrext1];
interieurSup1 = Map[{0, 0, 0.1} + # &, listept2];
interieurOk1 = RotateLeft[listept2];
ptsMarchesIntOk1 = Transpose[ptsMarchesInt1];
ptsMarchesInt1 = Flatten[{{interieurOk1}, {interieurSup1}}, 1];
ptsMarchesExtOk1 =
  Transpose[Flatten[{{RotateLeft[listept1]}, {exterieurSup1}}, 1]];
hautContreint1 = Flatten[{{listept2}, {interieurSup1}}, 1];
ptsHautContreint1 = Transpose[hautContreint1];
```

```

listepth = Flatten[{{listept1}, {listept2}}, 1];
listepthtr = Transpose[listepth];
mapline = Map[Line, listepthtr];
Graphics3D[mapline]

```

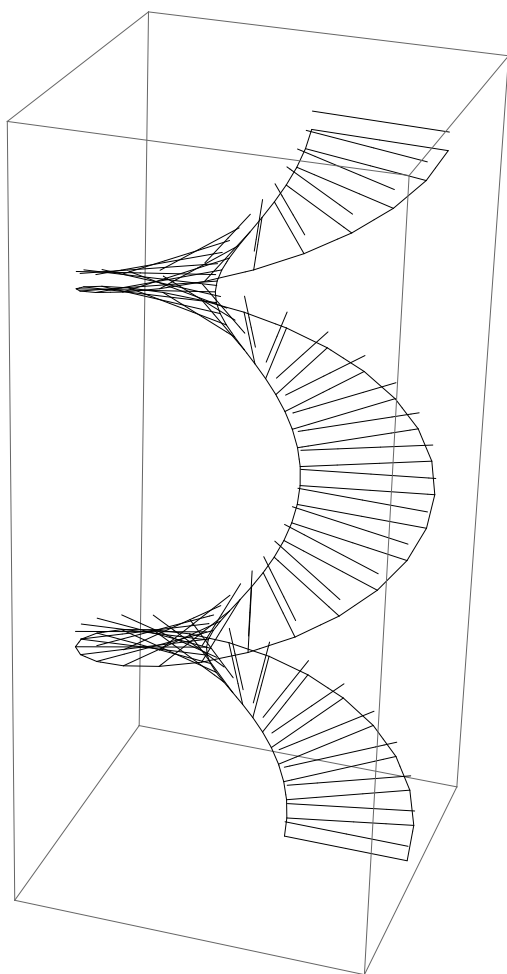


```

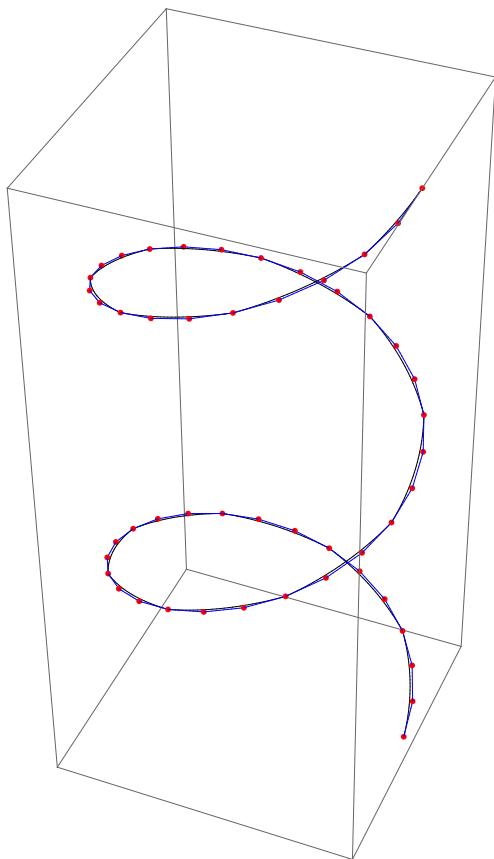
mapdecal = Map[{0, 0, 0.1} + # &, listepthtr, {2}];
maplinenez = Map[Line, mapdecal];
nonbezier1 = Graphics3D[Line[listept1]];
nonbezier2 = Graphics3D[Line[listept2]];
ligne = Graphics3D[mapline];
lignehez = Graphics3D[maplinenez];

```

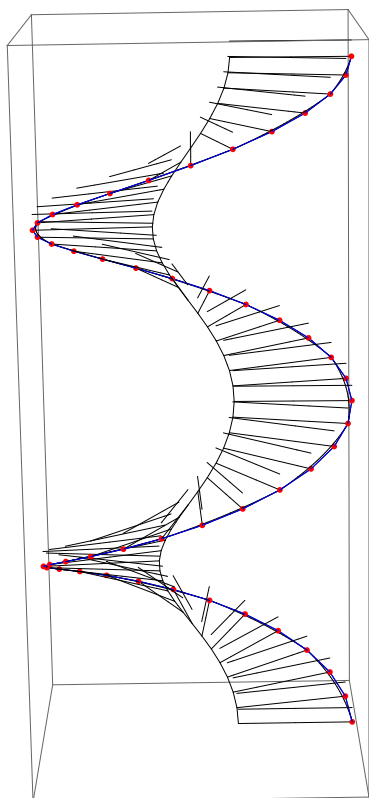
```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez}]
```



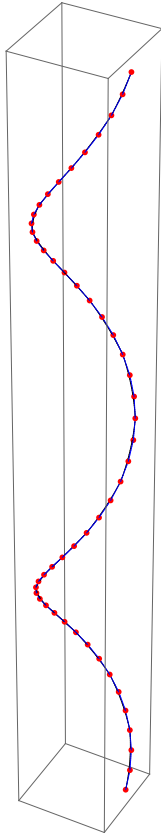

```
bezierext =  
Graphics3D[{BezierCurve[listept1], Blue, Line[listept1], Red, Point[listept1]}]
```



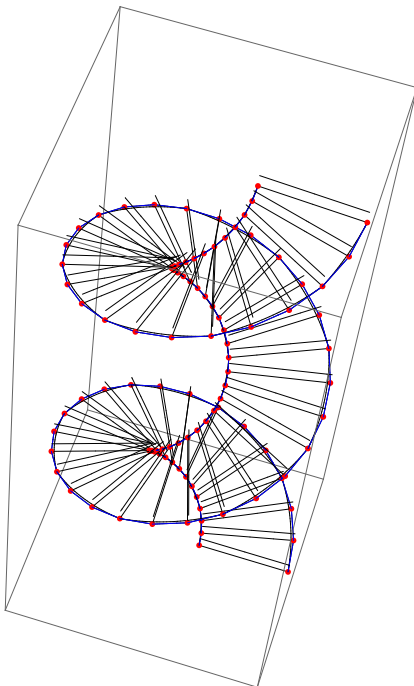
```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez, bezierext}]
```



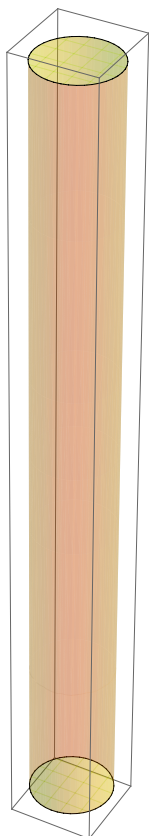
```
bezierint =  
Graphics3D[{BezierCurve[listept2], Blue, Line[listept2], Red, Point[listept2]}]
```



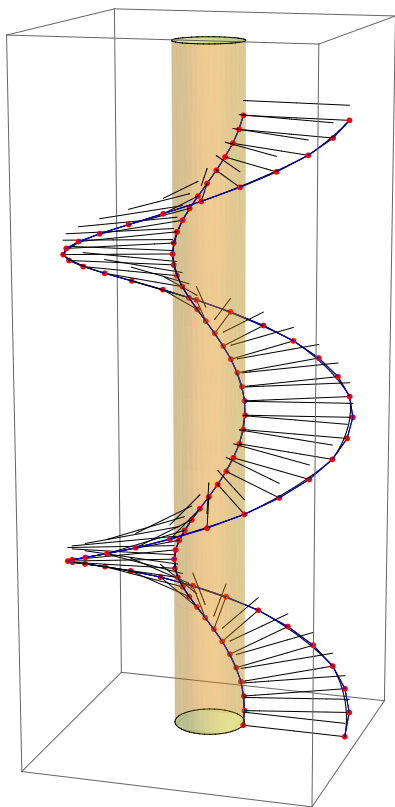
```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez, bezierext, bezierint}]
```



```
tube = Graphics3D[
  {Opacity[0.25], RGBColor[1, 3, 0], Cylinder[{{0, 0, 0}, {0, 0, 1.55 Pi}}, 0.25]}]
```



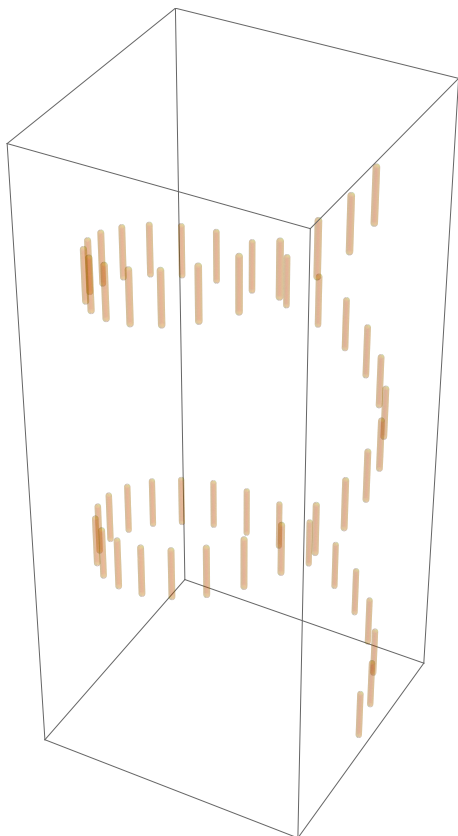
```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez, bezierext, bezierint, tube}]
```



```

mapdecalgarde = Map[{0, 0, 0.5} + # &, {listept1}, {2}];
mapdecalgarde1 = Map[{0, 0, 0.5} + # &, listept1];
Listedepointgardecorps1 = Flatten[{{mapdecalgarde1}, {exterieurSup1}}, 1];
ptsGarCor1 = Transpose[Listedepointgardecorps1];
ligneGardeCor1 = Map[Line, ptsGarCor1];
barriere = Graphics3D[{Opacity[0.25], RGBColor[1, 3, 0], Tube[ptsGarCor1]}]

```

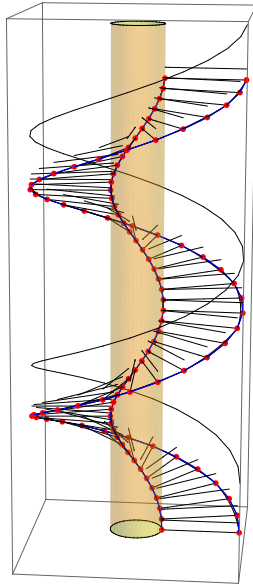


```

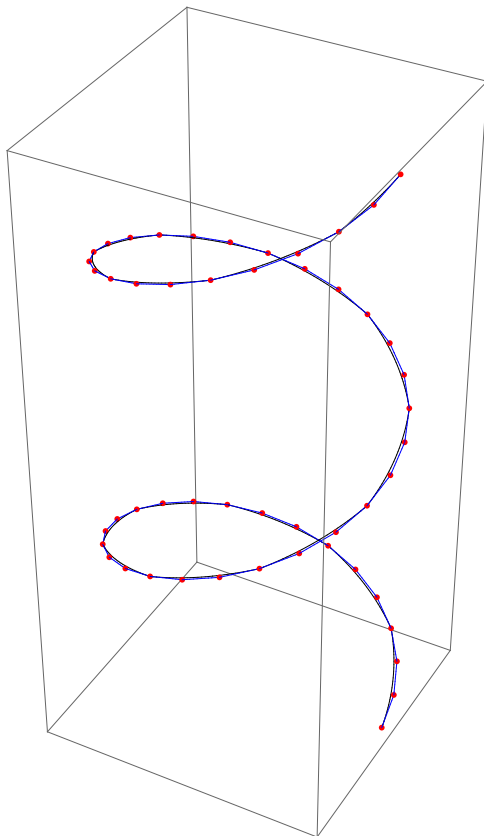
maplinegarde = Map[Line, mapdecalgarde];
lignegarde = Graphics3D[maplinegarde];

```

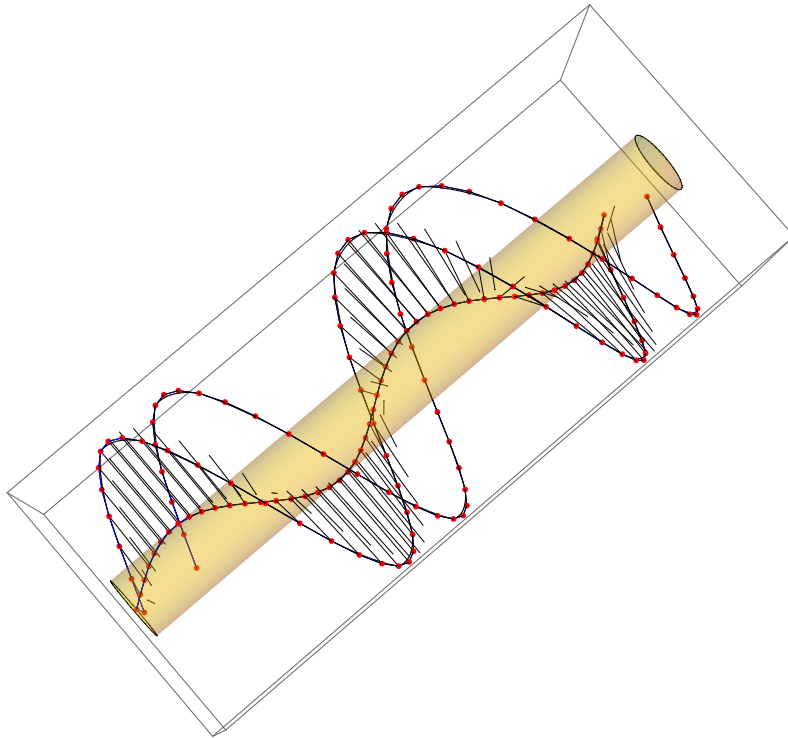
```
Show[{nonbezier1, nonbezier2, ligneh,
      lignehez, bezierext, bezierint, tube, lignegarde}]
```



```
beziergarde = Graphics3D[{BezierCurve[mapdecalgarde],
      Blue, Line[mapdecalgarde], Red, Point[mapdecalgarde]}]
```



```
Show[{nonbezier1, nonbezier2, ligneh, lignehez,
      bezierext, bezierint, tube, lignegarde, beziergarde}]
```

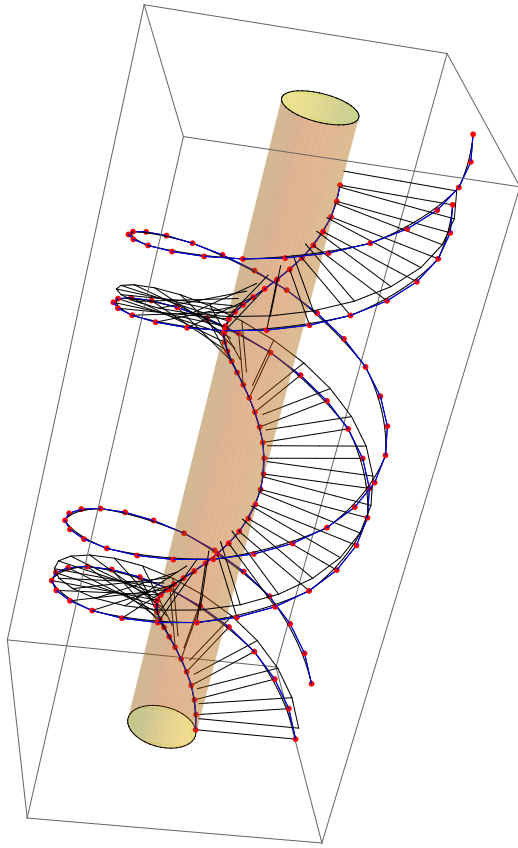


```
mapdecalmarche = Map[{0, 0, -0.4} + # &, {mapdecalgarde}, {3}];
```

```
maplinemarche = Map[Line, mapdecalmarche];
```

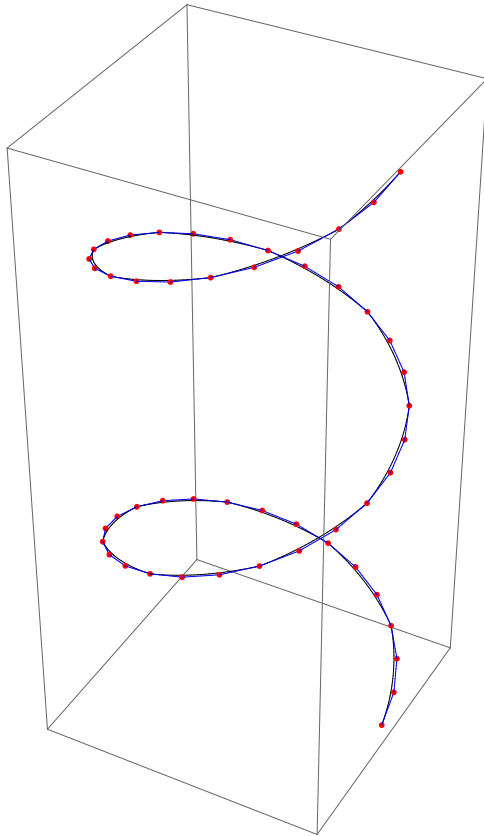
```
lignemarche = Graphics3D[maplinemarche];
```

```
Show[{nonbezier1, nonbezier2, ligneh, lignehez,
      bezierext, bezierint, tube, lignegarde, beziergarde, lignemarche}]
```

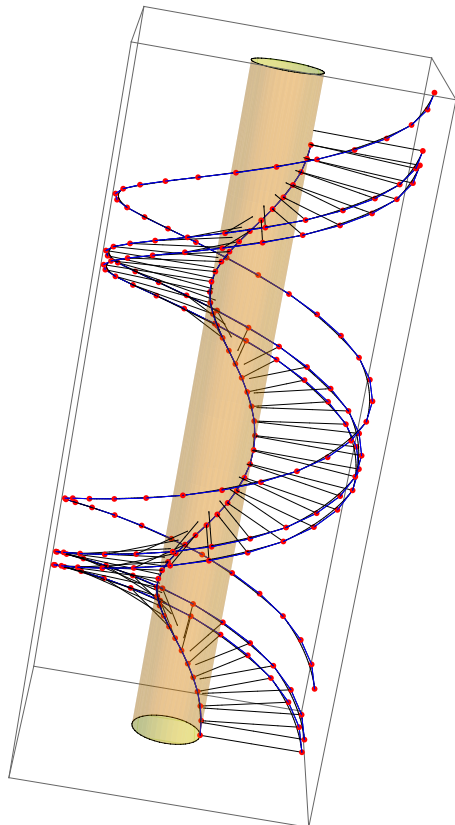


```
mapdecalmarcheflat = Flatten[Map[{0, 0, -0.4} + # &, {mapdecalgarde}, {3}], 2];
```

```
beziermarche = Graphics3D[{BezierCurve[mapdecalmarcheflat],
  Blue, Line[mapdecalmarcheflat], Red, Point[mapdecalmarcheflat]}]
```

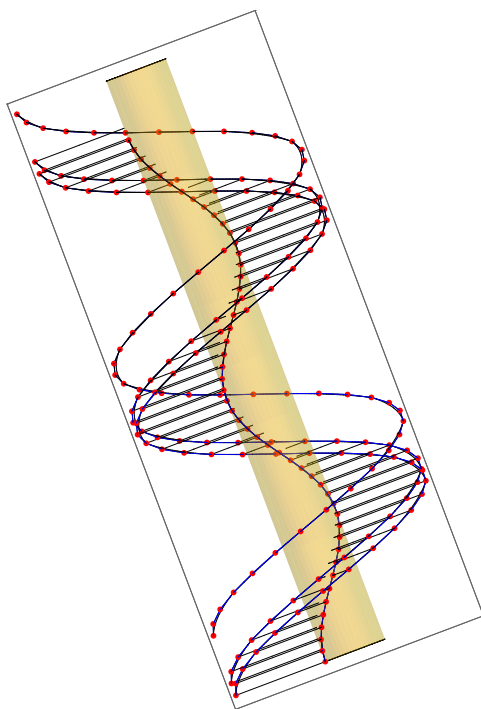


```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez, bezierext,
  bezierint, tube, lignegarde, beziergarde, lignemarche, beziermarche}]
```



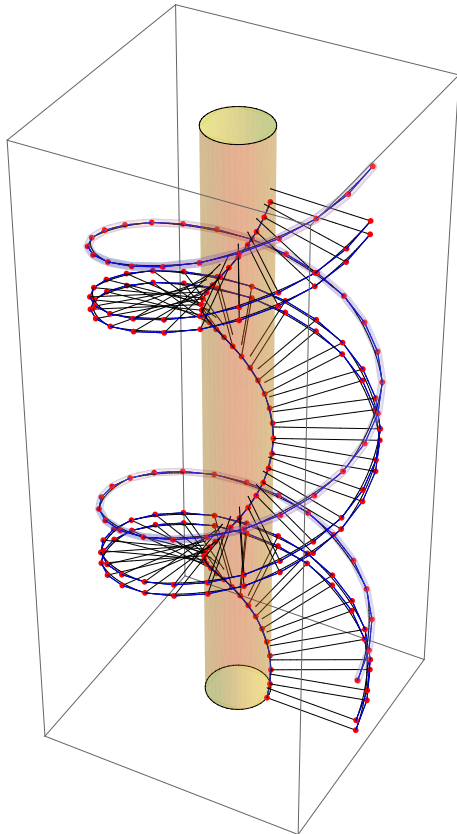

```
Options[Graphics3D];
```

```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez,  
      bezierext, bezierint, tube, lignegarde, beziergarde,  
      lignemarche, beziermarche}, ViewPoint -> {0, Infinity, 0}]
```



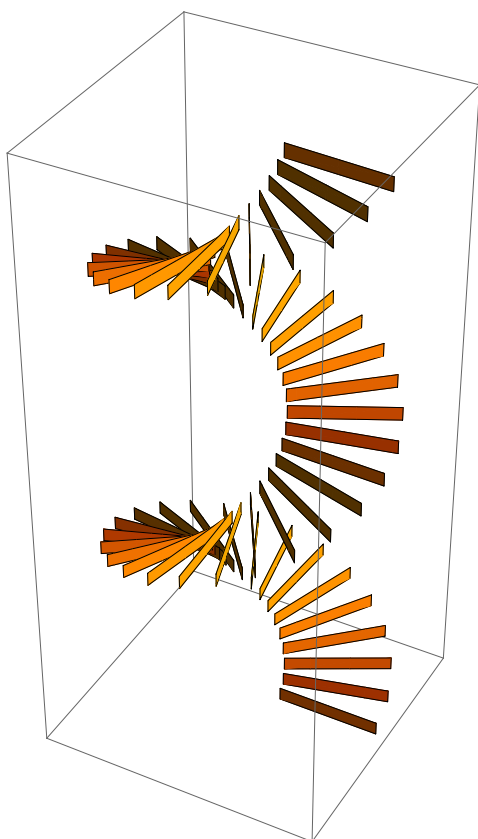
```
tubegarde = Graphics3D[  
  {Opacity[0.25], Tube[Map[{0, 0, 0.5} + # &, {listept1}, {2}], 0.028]}];
```

```
Show[{nonbezier1, nonbezier2, ligneh, lignehez, bezierext, bezierint,
      tube, lignegarde, beziergarde, lignemarche, beziermarche, tubegarde}]
```

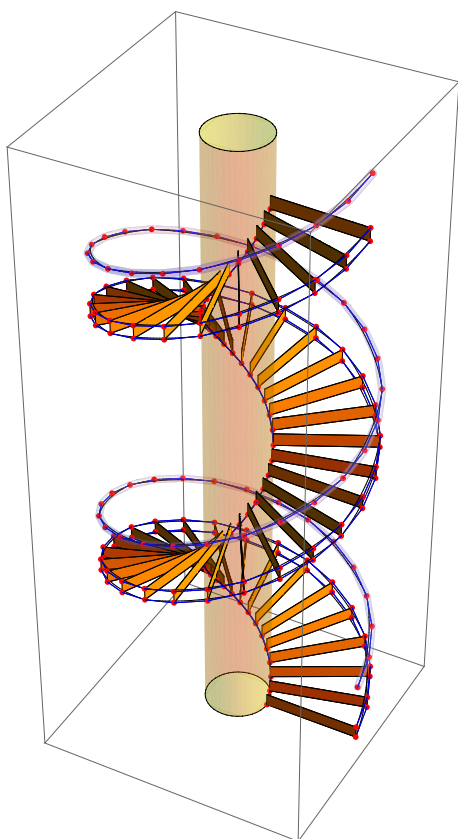


```
SurfContremarche1 = Map[Polygon,
  {Flatten[Table[{ptsHautContreint1[[i, j]], ptsHautContrext1[[i, j]],
    ptsHautContrext1[[i, j + 1]], ptsHautContreint1[[i, j + 1]],
    ptsHautContreint1[[i, j]]}, {i, 1, Length[ptsHautContreint1]},
    {j, 1, Length[ptsHautContrext1[1]]}], 1}], {2}];
```

```
surfcm = Graphics3D[{RGBColor[1, 3, 0], SurfContremarche1}]
```



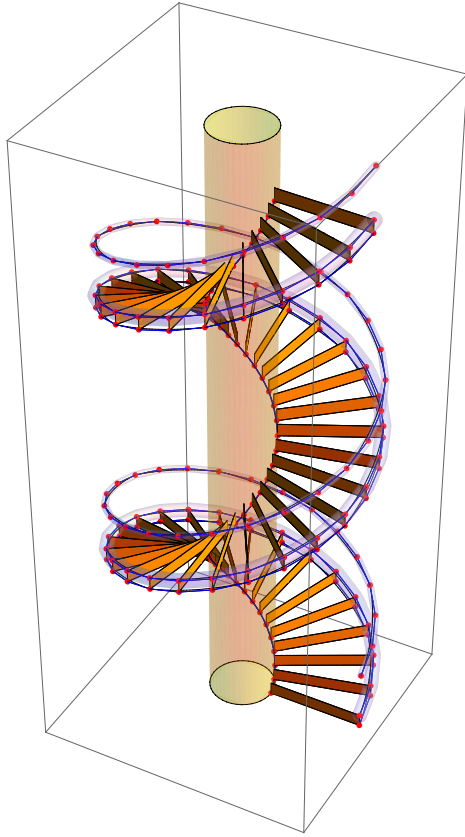
```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez, bezierext, bezierint, tube,  
lignegarde, beziergarde, lignemarche, beziermarche, tubegarde, surfcm}]
```



```

tubemarche = Graphics3D[
  {Opacity[0.25], Tube[Map[{0, 0, 0.1} + # &, {listept1}, {2}], 0.055]}}];
Show[{nonbezier1, nonbezier2, ligneh, lignehez,
  bezierext, bezierint, tube, lignegarde, beziergarde,
  lignemarche, beziermarche, tubegarde, surfcm, tubemarche}]

```

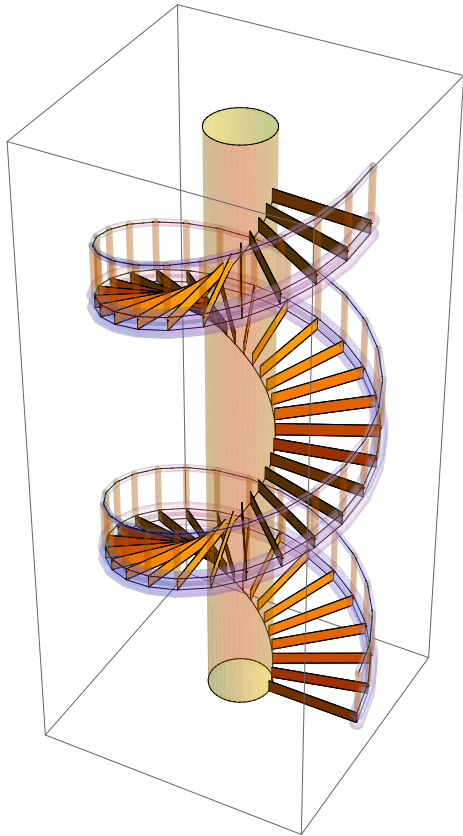


```

tubeext = Graphics3D[{Opacity[0.25], Tube[{listept1}, 0.055]}}];

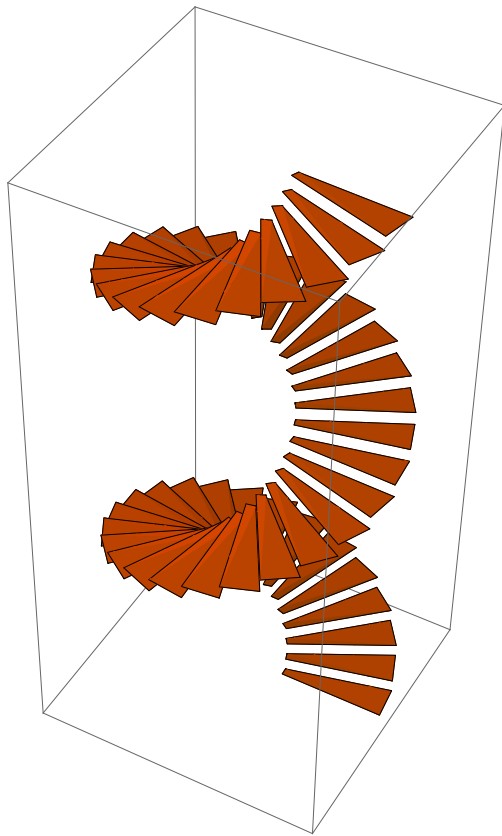
```

```
Show[{nonbezier1, nonbezier2, ligneh, lignehez, tube, lignegarde,
      lignemarche, tubegarde, surfcm, tubemarche, tubeext, barriere}]
```



```
pointsSurfMarche1 =
  Table[{ptsMarchesIntOK1[[i, j]], ptsMarchesExtOK1[[i, j]], ptsMarchesExtOK1[[
    i, j + 1]], ptsMarchesIntOK1[[i, j + 1]], ptsMarchesIntOK1[[i, j]]},
    {i, 1, Length[ptsMarchesIntOK1]}, {j, 1, Length[ptsMarchesExtOK1[1]]}];
surfmarcheOk1 = Delete[Map[Polygon, pointsSurfMarche1, {2}], -1];
```

```
surfacemarche = Graphics3D[{RGBColor[1, 0.3, 0], surfmarche0k1}]
```



```
Show[{nonbezier1, nonbezier2, ligneh, lignehez, tube,  
      lignegarde, lignemarche, surfcm, barriere, surfacemarche}]
```

