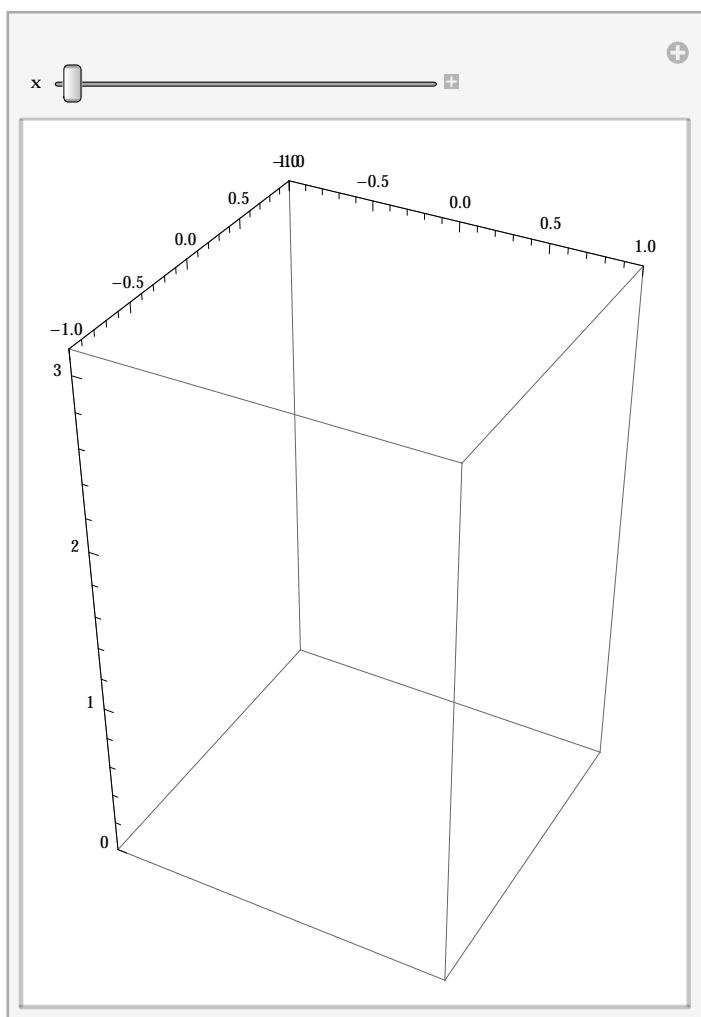
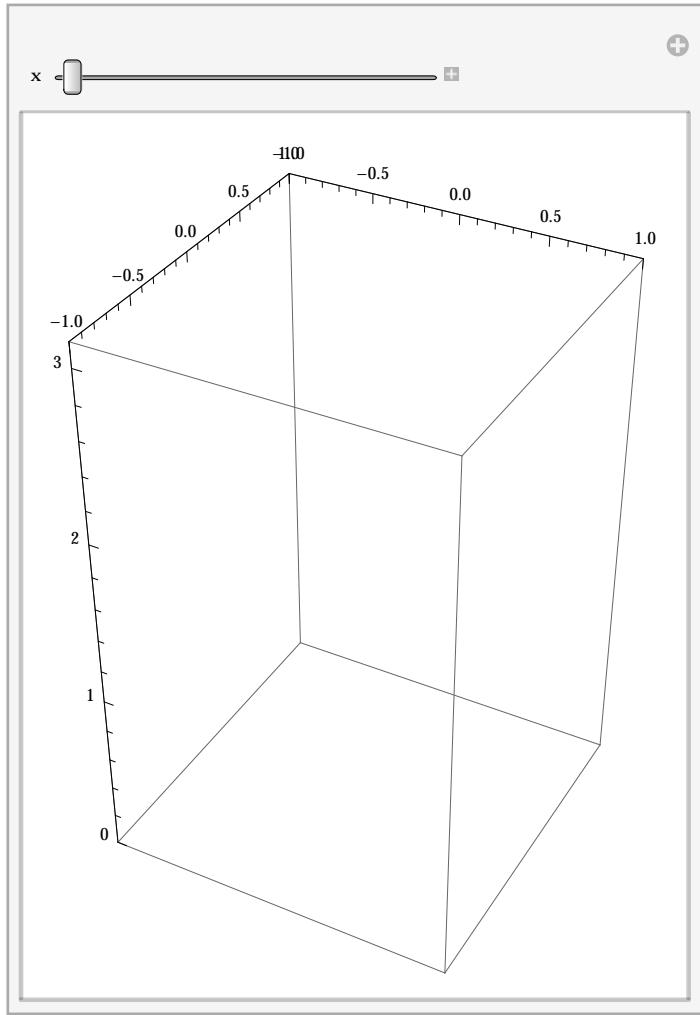


```
helix[a_, b_][t_] := {a Cos[t], a Sin[t], b*t}

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], fz},
{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];

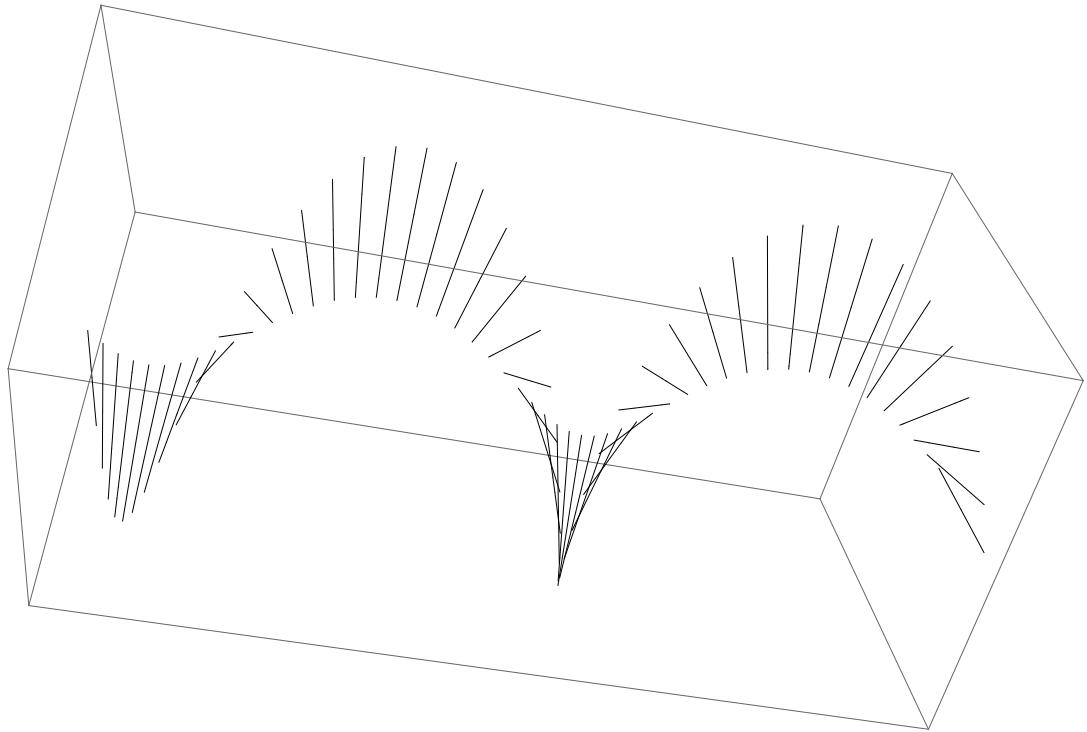
ptsMarchesInt1 = Flatten[{{interieurOk1}, {interieurSup1}}, 1];

ptsMarchesExtOK1 =
Transpose[Flatten[{{RotateLeft[listept1]}, {exterieurSup1}}, 1]];

hautContreint1 = Flatten[{{listept2}, {interieurSup1}}, 1];

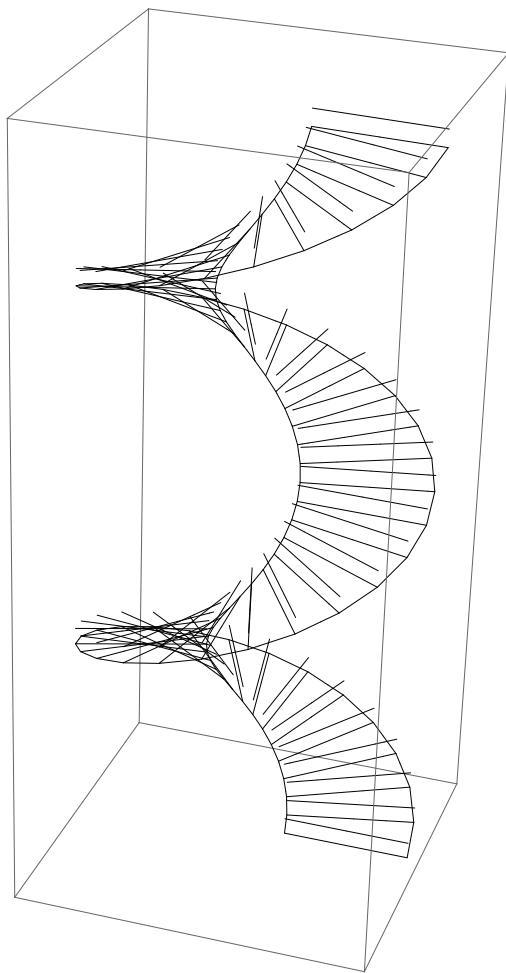
ptsHautContreint1 = Transpose[hautContreint1];
```

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



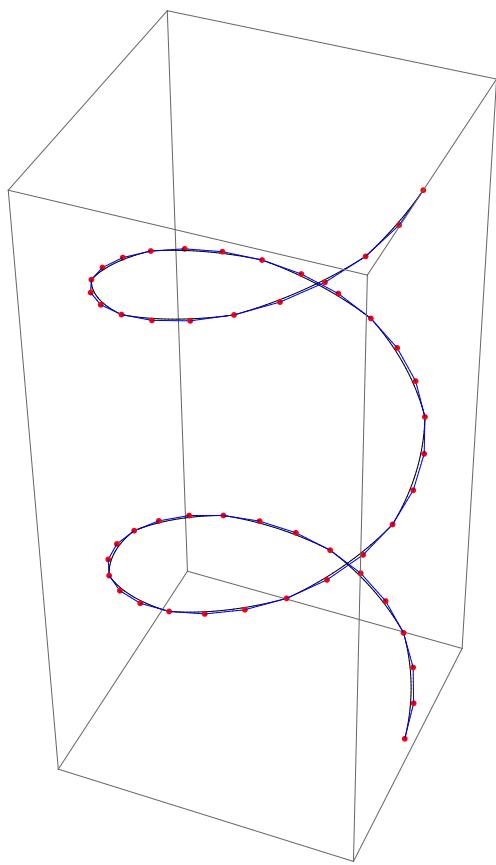
```
mapdecal = Map[{0, 0, 0.1} + # &, listepthtr, {2}];  
maplinenez = Map[Line, mapdecal];  
nonbezier1 = Graphics3D[Line[listept1]];  
nonbezier2 = Graphics3D[Line[listept2]];  
ligneH = Graphics3D[mapline];  
ligneHnez = Graphics3D[maplinenez];
```

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

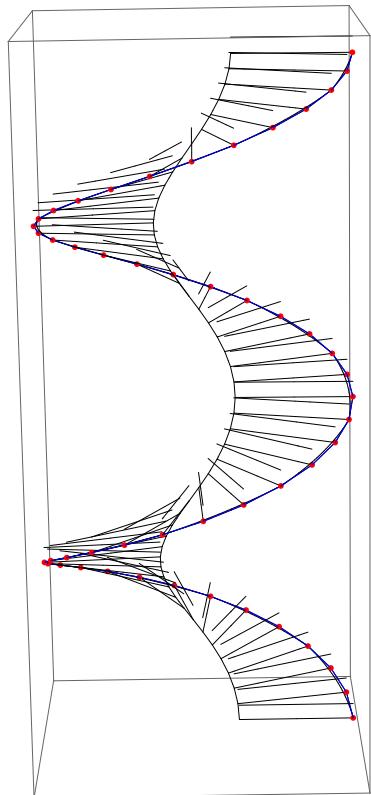


```
bezierext =
```

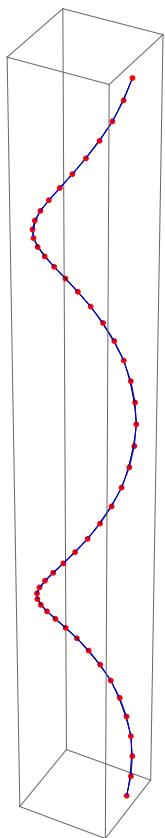
```
Graphics3D[{BezierCurve[listep1], Blue, Line[listep1], Red, Point[listep1]}]
```



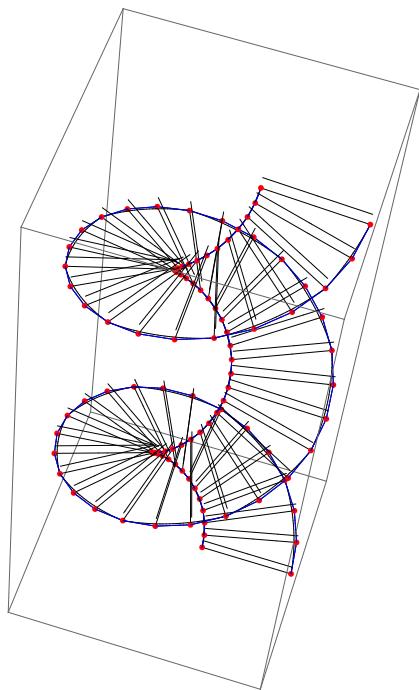
```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez, bezierext}]
```



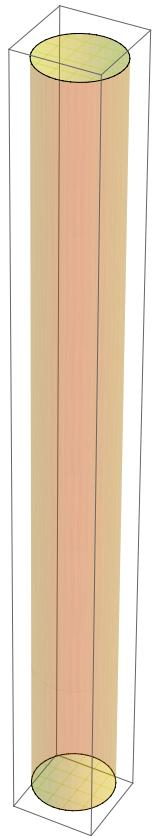
```
bezierint =
Graphics3D[{BezierCurve[listept2], Blue, Line[listept2], Red, Point[listept2]}]
```



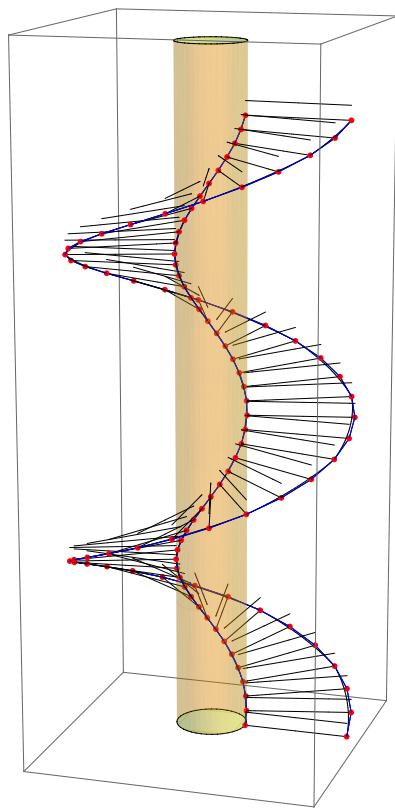
```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez, bezierext, bezierint}]
```



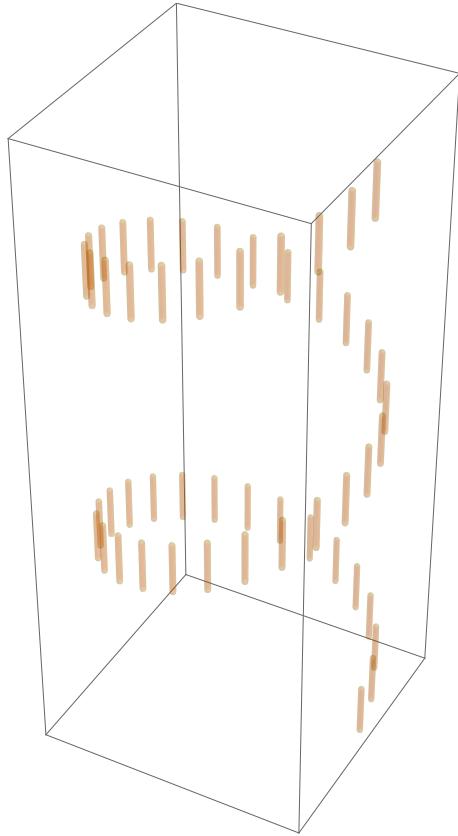
```
tube = Graphics3D[  
  {Opacity[0.25], RGBColor[1, 3, 0], Cylinder[{{0, 0, 0}, {0, 0, 1.55 Pi}}, 0.25]}]
```



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

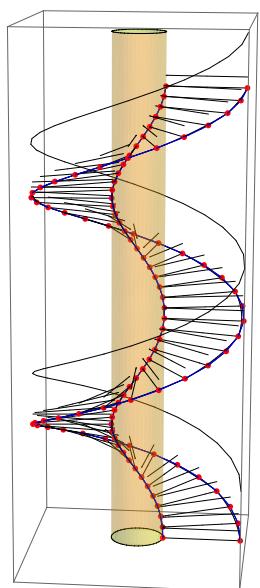


```
mapdecalgarde = Map[{0, 0, 0.5} + # &, {listept1}, {2}];  
mapdecalgarde1 = Map[{0, 0, 0.5} + # &, listept1];  
Listedepointgardecorps1 = Flatten[{{mapdecalgarde1}, {exterieursup1}}, 1];  
ptsGarCor1 = Transpose[Listedepointgardecorps1];  
ligneGardeCor1 = Map[Line, ptsGarCor1];  
barriere = Graphics3D[{Opacity[0.25], RGBColor[1, 3, 0], Tube[ligneGardeCor1]}]
```

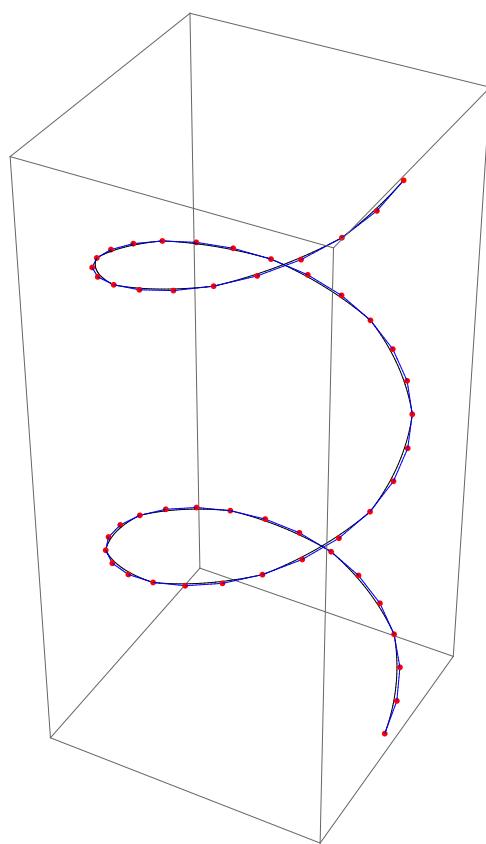


```
maplinegarde = Map[Line, mapdecalgarde];  
lignegarde = Graphics3D[maplinegarde];
```

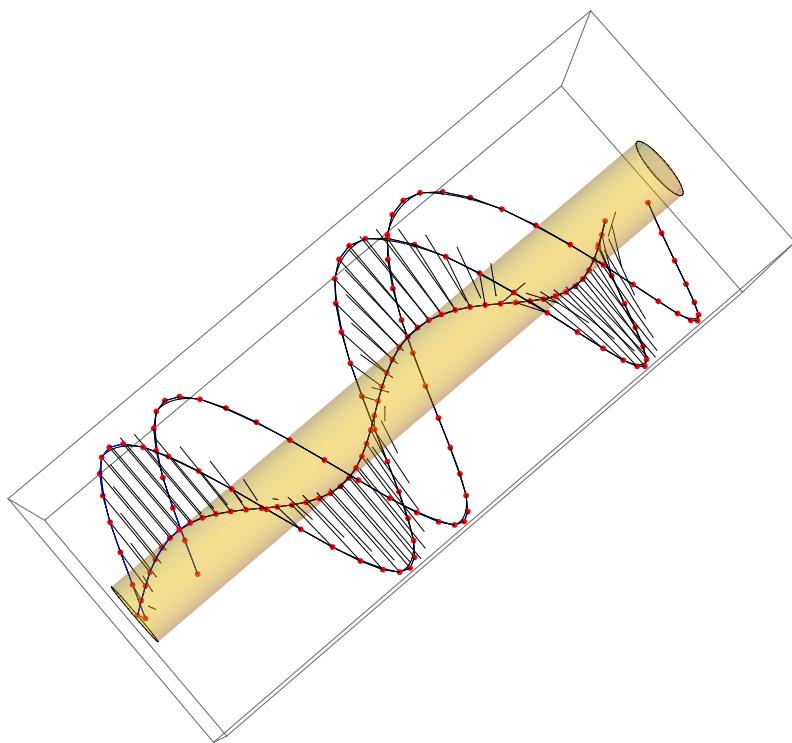
```
Show[{nonbezier1, nonbezier2, ligneh,
ligneheze, bezierext, bezierint, tube, lignegarde}]
```



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

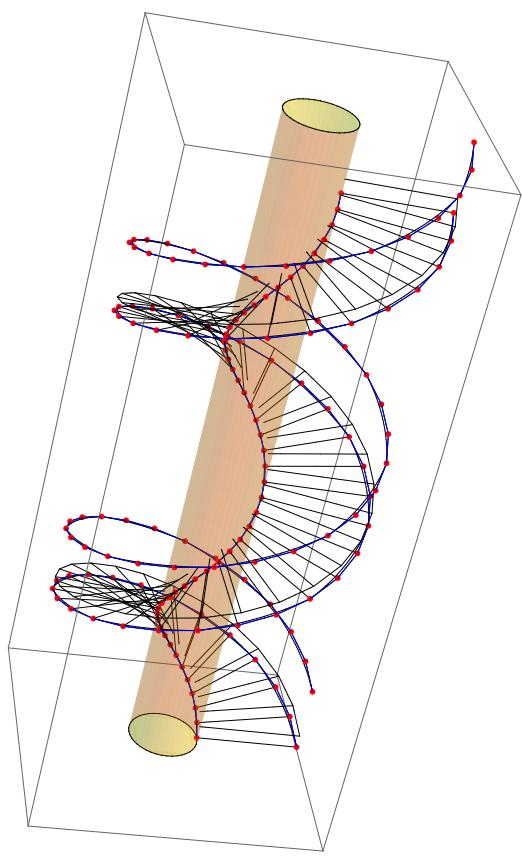


```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez,  
bezierext, bezierint, tube, lignegarde, beziergarde}]
```



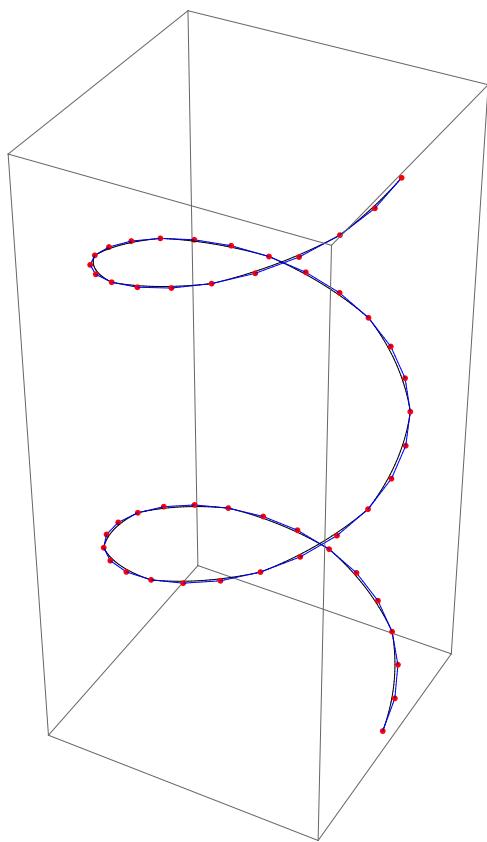
```
mapdecalmarche = Map[{0, 0, -0.4} + # &, {mapdecalgarde}, {3}];  
maplinemarche = Map[Line, mapdecalmarche];  
lignemarche = Graphics3D[maplinemarche];
```

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

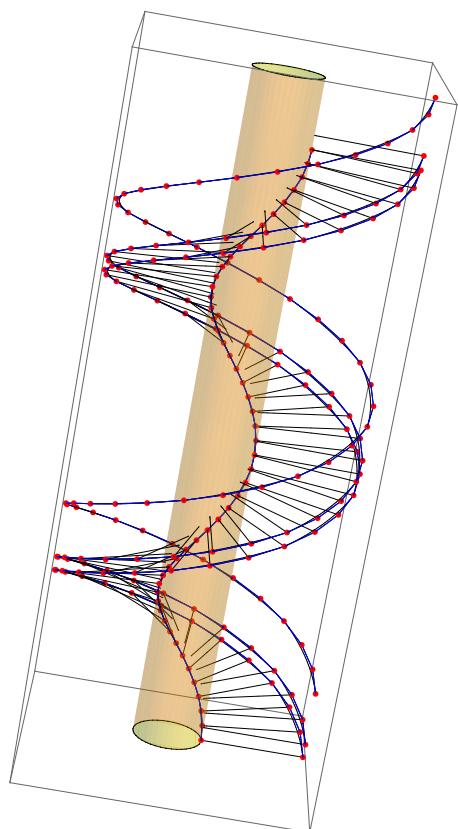


```
mapdecalmarcheflat = Flatten[Map[{0, 0, -0.4} + # &, {mapdecalgarde}, {3}], 2];
```

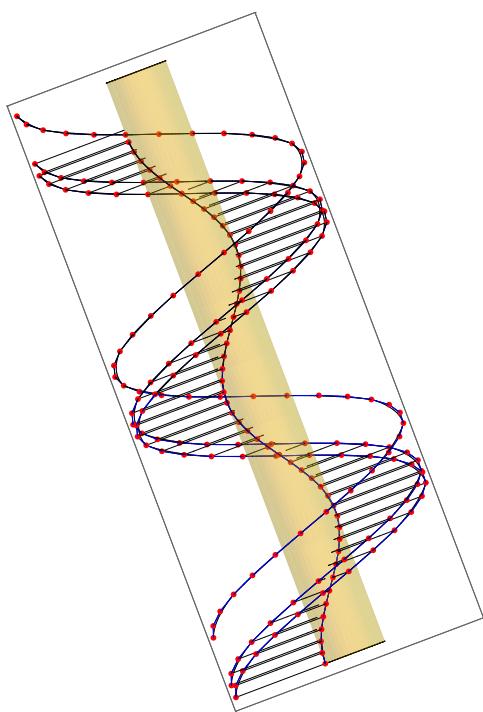
```
beziermarche = Graphics3D[{BezierCurve[mapdecalmarcheflat],  
  Blue, Line[mapdecalmarcheflat], Red, Point[mapdecalmarcheflat]}]
```



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

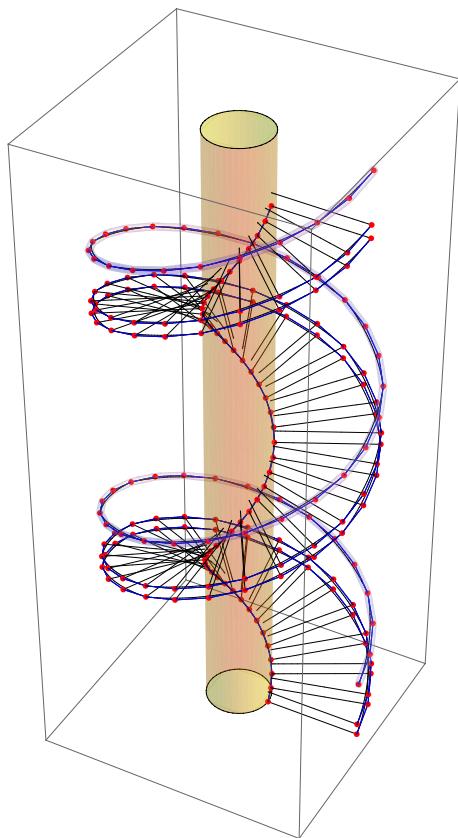


```
Options[Graphics3D];  
  
Show[{nonbezier1, nonbezier2, ligneh, lignehnez,  
bezierext, bezierint, tube, lignegarde, beziergarde,  
lignemarche, beziermarche}, ViewPoint → {0, Infinity, 0}]
```



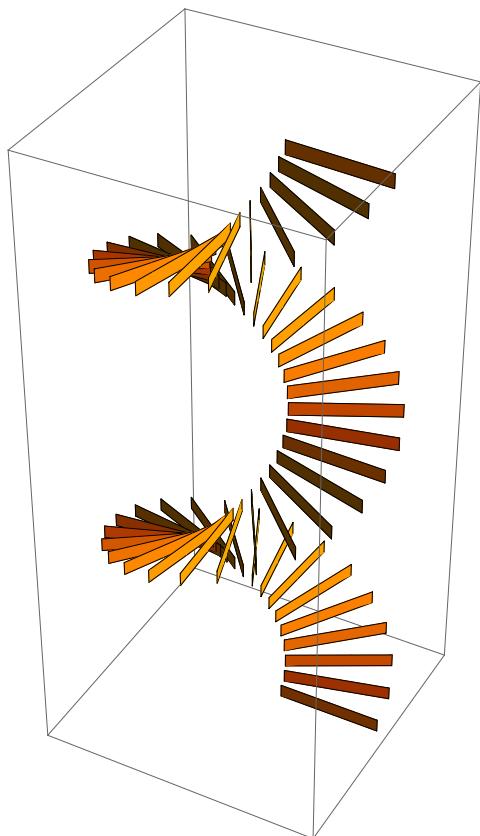
```
tubegarde = Graphics3D[  
{Opacity[0.25], Tube[Map[{0, 0, 0.5} + # &, {listep1}, {2}], 0.028]}];
```

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

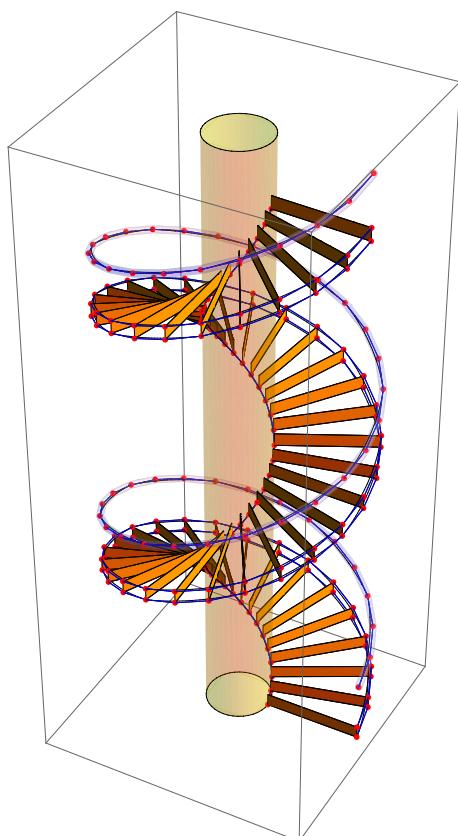


```
SurfContremarchel = Map[Polygon,
{Flatten[Table[{ptsHautContreint1[[i, j]], ptsHautContrext1[[i, j]],
ptsHautContrext1[[i, j + 1]], ptsHautContreint1[[i, j + 1]],
ptsHautContreint1[[i, j]]}, {i, 1, Length[ptsHautContreint1]}, {j, 1, Length[ptsHautContrext1[1]]}], 1}], {2}];
```

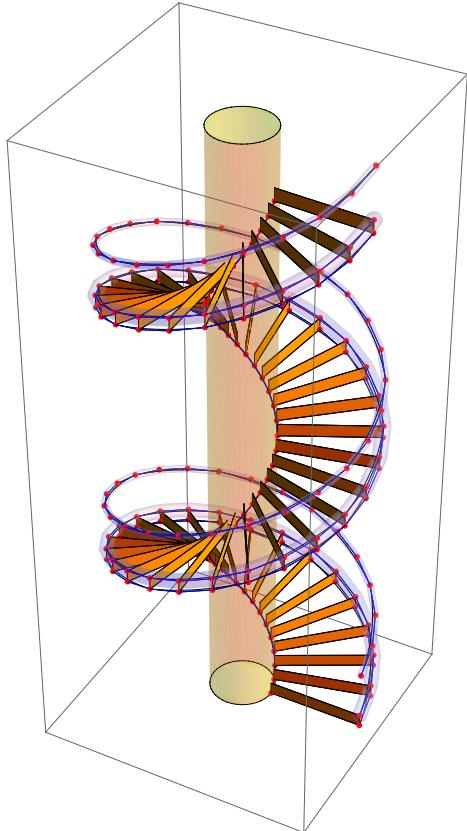
```
surfcm = Graphics3D[{RGBColor[1, 3, 0], SurfContremarche1}]
```



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

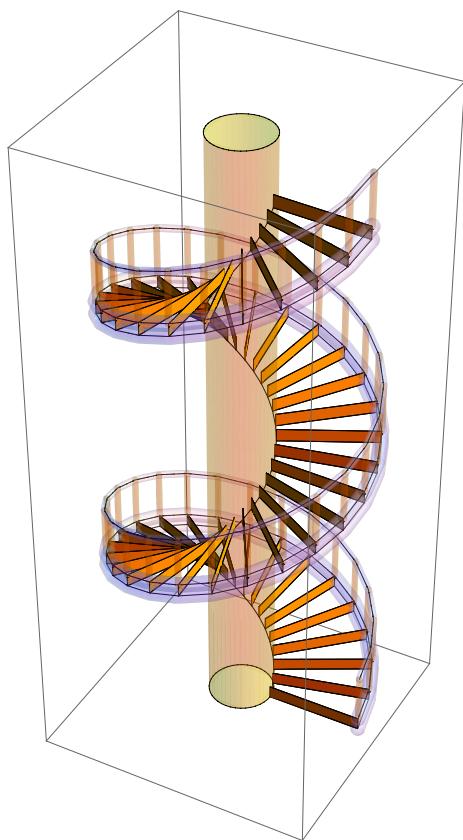


```
tubemarche = Graphics3D[  
  {Opacity[0.25], Tube[Map[{0, 0, 0.1} + # &, {listept1}, {2}], 0.055]}];  
  
Show[{nonbezier1, nonbezier2, ligneh, lignehnez,  
  bezierext, bezierint, tube, lignegarde, beziergarde,  
  lignemarche, beziermarche, tubegarde, surfcm, tubemarche}]
```



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

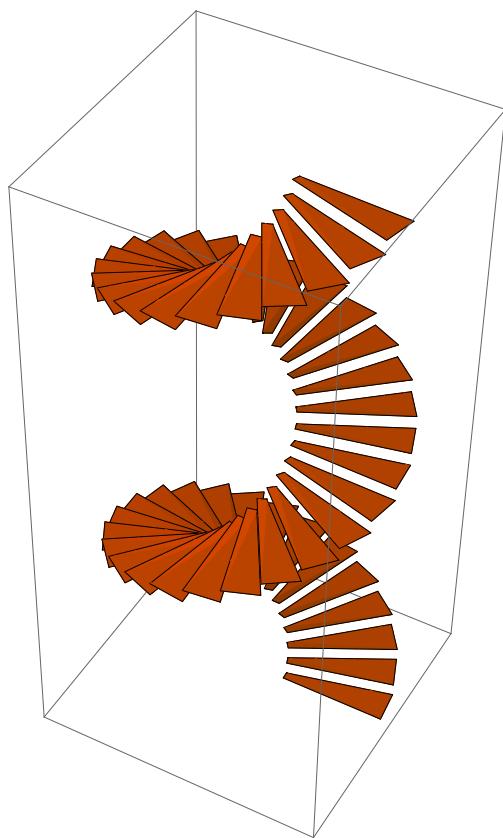
```
Show[{nonbezier1, nonbezier2, ligneh, lignehnez, tube, lignegarde,
lignemarche, tubegarde, surfcm, tubemarche, tubeext, barriere}]
```



```
pointsSurfMarchel =
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, pointsSurfMarchel, {2}], -1];
```

```
surfemarche = Graphics3D[{RGBColor[1, 0.3, 0], surfmarcheOk1}]
```



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

