

# Line

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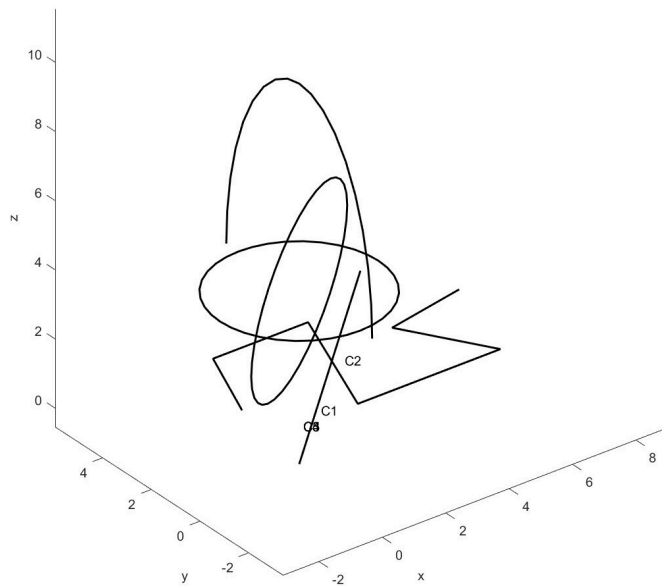
## 1 介绍

Line类是用来生成3D的曲线，基于Nurb tool<sup>[1]</sup>，生成3D曲线。

## 2 案例

### 2.1 Add different curves (Flag=1)

```
1 %% AddLine
2 a=Point('Point Ass1');
3 a=AddPoint(a,[0;5],[0;4],[0;2]);
4 b=Line('Line Ass1');
5 b=AddLine(b,a,1);
6 Plot(b,'clabel',1,'styles',{'-'});
7 %% AddCurve
8 P = [0.5 1.5 4.5 3.0 7.5 6.0 8.5;
9       3.0 5.5 5.5 1.5 1.5 4.0 4.5;
10      0.0 0.0 0.0 0.0 0.0 0.0 0.0];
11 a=AddPoint(a,P(1,:),P(2,:),P(3,:));
12 b=AddCurve(b,a,2);
13 Plot(b,'clabel',1,'styles',{'-'});
14 %% AddCircle
15 a=AddPoint(a,0,0,5);
16 b=AddCircle(b,2.5,a,3);
17 b=AddCircle(b,3,a,3,'rot',[45,45,45]);
18 Plot(b,'clabel',1,'styles',{'-'});
19 %% AddEllipse
20 b=AddEllipse(b,6,3,a,3,'rot',[0,-90,0],'sang',-90,'ang',180);
21 Plot(b,'clabel',1,'styles',{'-'});
22 %% AddNurb
23 coefs = [0.0 7.5 15.0 25.0 35.0 30.0 27.5 30.0;
24          0.0 2.5 0.0 -5.0 5.0 15.0 22.5 30.0;
25          0 0 0 0 0 0 0 0];
26 knots = [0.0 0.0 0.0 1/6 1/3 1/2 2/3 5/6 1.0 1.0 1.0];
27 b=AddNurb(b,coefs,knots);
28 Plot(b,'clabel',1,'styles',{'-'});
```



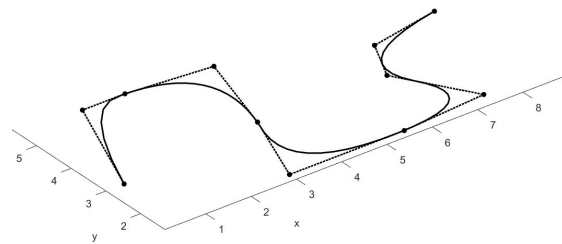
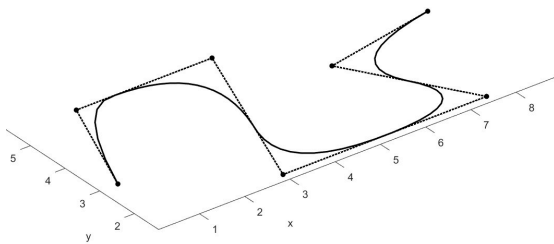
## 2.2 Insert new knots (Flag=2)

Nurb曲线插入新的控制点。

```

1 | coefs = [0.5 1.5 4.5 3.0 7.5 6.0 8.5;
2 |         3.0 5.5 5.5 1.5 1.5 4.0 4.5;
3 |         0.0 0.0 0.0 0.0 0.0 0.0 0.0]';
4 | knots=[0 0 0 1/10 2/5 3/5 4/5 1 1 1];
5 | b=Line('Line Ass1');
6 | b=AddNurb(b,coefs,knots);
7 | Plot(b,'coefs',1);
8 | b=InsertKnots(b,1,[0.125 0.375 0.625 0.875]);
9 | Plot(b,'coefs',1);

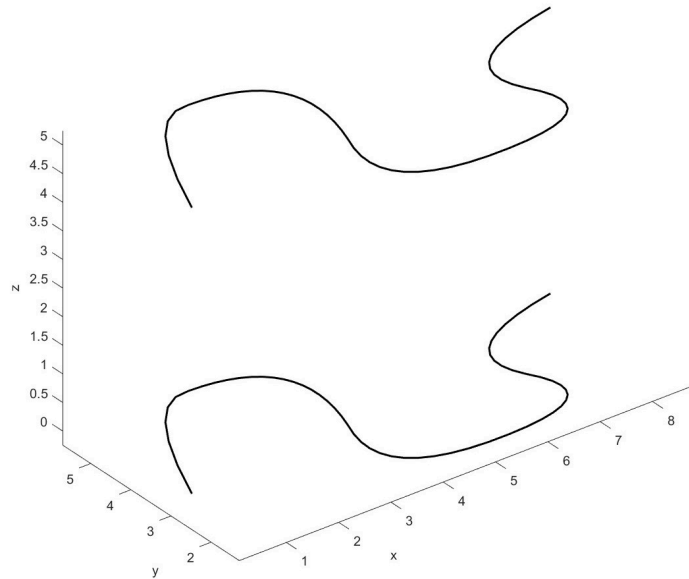
```



## 2.3 Move curve (Flag=3)

移动曲线。

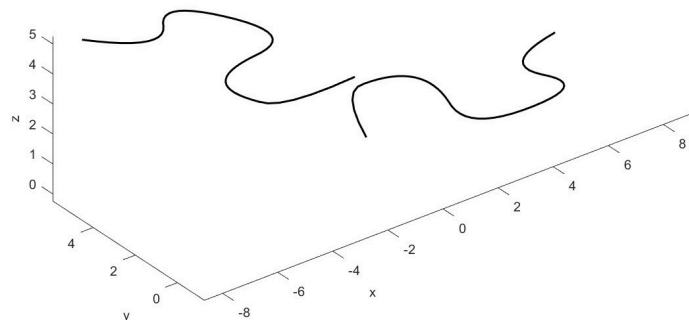
```
1 | coefs = [0.5 1.5 4.5 3.0 7.5 6.0 8.5;  
2 |         3.0 5.5 5.5 1.5 1.5 4.0 4.5;  
3 |         0.0 0.0 0.0 0.0 0.0 0.0 0.0]';  
4 | knots=[0 0 0 1/10 2/5 3/5 4/5 1 1 1];  
5 | b=Line('Line Ass1');  
6 | b=AddNurb(b,coefs,knots);  
7 | b=Move(b,1,[0,0,5], 'new',1);  
8 | Plot(b);
```



## 2.4 Rotate curve (Flag=4)

旋转曲线。

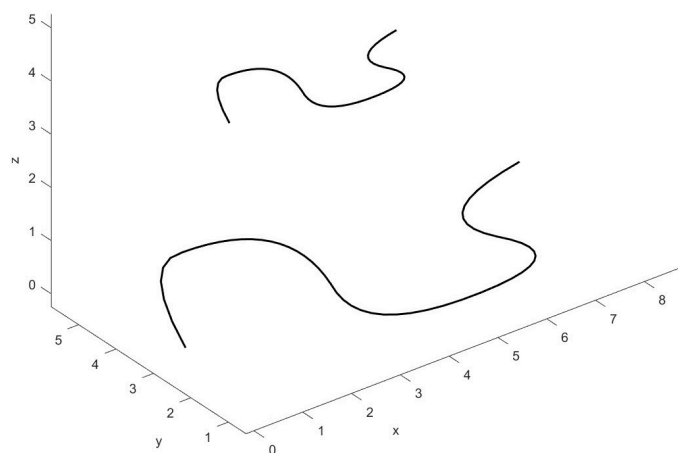
```
1 | coefs = [0.5 1.5 4.5 3.0 7.5 6.0 8.5;  
2 |         3.0 5.5 5.5 1.5 1.5 4.0 4.5;  
3 |         0.0 0.0 0.0 0.0 0.0 0.0 0.0]';  
4 | knots=[0 0 0 1/10 2/5 3/5 4/5 1 1 1];  
5 | b=Line('Line Ass1');  
6 | b=AddNurb(b,coefs,knots);  
7 | b=Move(b,1,[0,0,5], 'new',1);  
8 | b=Rotate(b,2,[0,0,90]);  
9 | Plot(b);
```



## 2.5 Scale curve (Flag=5)

缩放曲线。

```
1  coefs = [0.5 1.5 4.5 3.0 7.5 6.0 8.5;  
2      3.0 5.5 5.5 1.5 1.5 4.0 4.5;  
3      0.0 0.0 0.0 0.0 0.0 0.0 0.0];  
4  knots=[0 0 0 1/10 2/5 3/5 4/5 1 1 1];  
5  b=Line('Line Ass1');  
6  b=AddNurb(b,coefs,knots);  
7  b=Move(b,1,[0,0,5],'new',1);  
8  b=Scale(b,2,[0.5,0.5,1]);  
9  Plot(b);
```



## 3 CheatTable

Name	Varargin	Description
AddCircle(obj,r,Point2D,P)	'sang','ang','seg','rot'	Add circle
AddCurve(obj,Point2D,P)		Add curve
AddEllipse( obj, a, b,Point2D,P)	'rot','sang','ang','seg'	Add ellipse
AddLine(obj,Point2D,P)		Add straight line
AddNurb(obj,coefs,knots)	'seg'	Add nurb curve
GetNcrv(obj)		Get total number of curve
InsertKnots(obj,LineNo,knots)		Insert knots
Help(obj)		Open help file
Move(obj,num,dis)	'new'	Move curve
Plot(obj)	'grid','axe','clabel','styles', 'equal','crv','map','color', 'base_size','xlim','ylim'	Plot line object
Plot2(obj)		Plot line on paraview
Rotate(obj,num,rot)	'new', 'ori'	Rotate curve
Scale(obj,num,factor)	'new', 'ori'	Sacale curve
VTKWrite(obj)		Write VTK file of line

## 4 参考文献

- [1] [https://ww2.mathworks.cn/matlabcentral/fileexchange/26390-nurbs-toolbox-by-d-m-spink?s\\_tid=srchtitle](https://ww2.mathworks.cn/matlabcentral/fileexchange/26390-nurbs-toolbox-by-d-m-spink?s_tid=srchtitle)