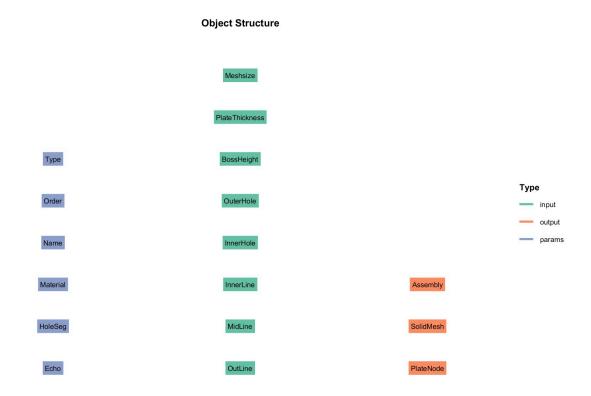
BossPlate

Xie Yu

1 介绍

BossPlate是一种带台阶的平板类。

2 类结构



输入 input:

• Meshsize: 单元尺寸

• PlateThickness: 板厚度

• OuterHole : 外部圆孔

• BossHeight: 台阶高度

• Outline: 外轮廓Line2D

• InnerHole: 内部圆孔

• InnerLinne: 内轮廓Line2D

• MidLine: 台阶轮廓Line2D

参数 params:

• Order: 单元阶数

• Type: 台阶板类型

• Name: 名称

• Hole: 圆孔环向网格划分数量

• Material: 材料

输出 output:

• Assembly: 实体单元装配

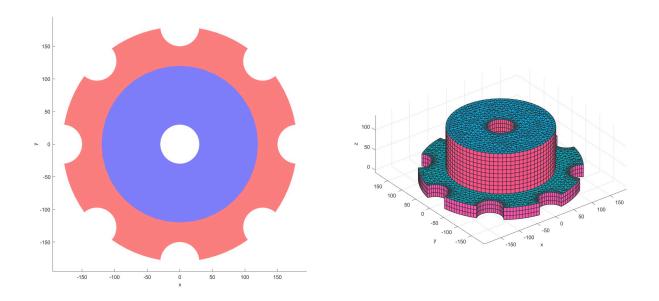
• SolidMesh: 实体网格

• PlateNode: 底面节点编号

3 案例

3.1 Create Boss plate1 (Flag=1)

```
1 a=Point2D('Points assembly');
    a=AddPoint(a,0,0);
 3
   Num=8;
 4
   R1=180;
   R2=120;
   R3=30;
 7
    r=30;
 8
   for i=1:Num
 9
    a=AddPoint(a,R1,-360/Num*(i-1),'polar','deg');
10
11
   Angle1=acos(r/2/R1)*2/pi*180;
12
    Angle2=360/Num-(180-Angle1)*2;
13
   b1=Line2D('OutLine');
14
   for i=1:Num
15
    Sang1=180-Angle1/2-(i-1)*360/Num;
   b1=AddCircle(b1,r,a,i+1,'sang',Sang1,'ang',Angle1);
    Sang2 = -180 + Angle1 - (i-1)*360 / Num;
18
    b1=AddCircle(b1,R1,a,1,'Sang',Sang2,'ang',-Angle2);
19
20
   b2=Line2D('MidLine');
21 b2=AddCircle(b2,R2,a,1);
    b3=Line2D('InnerLine');
23
    b3=AddCircle(b3,R3,a,1);
24
    inputStruct.OutLine=b1;
25
    inputStruct.MidLine=b2;
26
    inputStruct.InnerLine=b3;
    inputStruct.BossHeight=100;
28
    inputStruct.PlateThickness=30;
29
    inputStruct.Meshsize=10;
30
    paramsStruct=struct();
   obj= plate.BossPlate(paramsStruct, inputStruct);
    obj= obj.solve();
33
   Plot2D(obj);
34 Plot3D(obj);
```



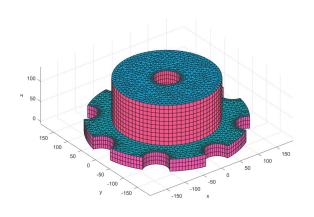
3.2 Deform the plate face (Flag=2)

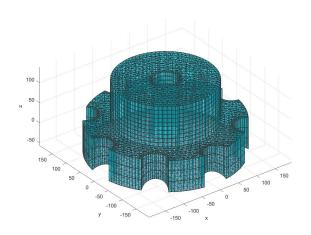
利用DeformFace可将台阶边缘进行轻微的变形(如果变形过大,可能会网格的畸变,此时可加密网格来缓解畸变)。

```
1
   a=Point2D('Points assembly');
 2
    a=AddPoint(a,0,0);
 3
   Num=8;
 4
   R1=180;
 5
    R2=120;
 6
   R3=30;
 7
    r=30;
 8
   for i=1:Num
 9
    a=AddPoint(a,R1,-360/Num*(i-1),'polar','deg');
10
    end
11
    Angle1=acos(r/2/R1)*2/pi*180;
12
    Angle2=360/Num-(180-Angle1)*2;
13
   b1=Line2D('OutLine');
14
   for i=1:Num
15
      Sang1=180-Angle1/2-(i-1)*360/Num;
16
      b1=AddCircle(b1,r,a,i+1,'sang',Sang1,'ang',Angle1);
17
      Sang2 = -180 + Angle1 - (i-1)*360/Num;
18
      b1=AddCircle(b1,R1,a,1,'Sang',Sang2,'ang',-Angle2);
19
    end
20
    b2=Line2D('MidLine');
21
    b2=AddCircle(b2,R2,a,1);
22
   b3=Line2D('InnerLine');
23
   b3=AddCircle(b3,R3,a,1);
    inputStruct.OutLine=b1;
25
    inputStruct.MidLine=b2;
26
    inputStruct.InnerLine=b3;
27
    inputStruct.BossHeight=100;
28
   inputStruct.PlateThickness=30;
29
    inputStruct.Meshsize=10;
30
   paramsStruct=struct();
31
    obj= plate.BossPlate(paramsStruct, inputStruct);
32
   ohi= ohi solve().
```

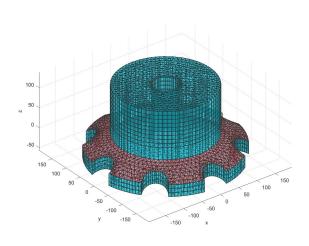
```
33  Plot3D(obj);
34  f1=@(r)(sqrt(360^2-r.^2)-360);
35  obj=DeformFace(obj,f1,1);
36  f2=@(r)(sqrt(360^2-r.^2)-360+30);
37  obj=DeformFace(obj,f2,2);
38  Plot3D(obj);
```

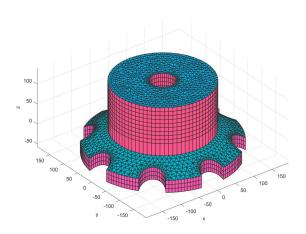
View face of elements





View face of elements





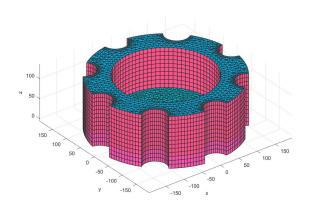
3.3 Extrude outsize surface (Flage=3)

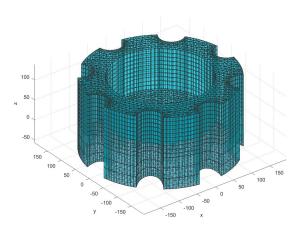
更改带台阶板的种类,可以改变台阶位置,将外侧拉伸。

```
1    a=Point2D('Points assembly');
2    a=AddPoint(a,0,0);
3    Num=8;
4    R1=180;
5    R2=120;
6    R3=30;
7    r=30;
8    for i=1:Num
```

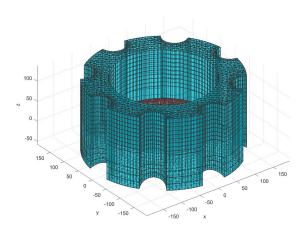
```
10
    end
11
    Angle1=acos(r/2/R1)*2/pi*180;
12
    Angle2=360/Num-(180-Angle1)*2;
13
   b1=Line2D('OutLine');
14
    for i=1:Num
15
    Sang1=180-Angle1/2-(i-1)*360/Num;
16
    b1=AddCircle(b1,r,a,i+1,'sang',Sang1,'ang',Angle1);
17
    Sang2=-180+Angle1-(i-1)*360/Num;
18
    b1=AddCircle(b1,R1,a,1,'Sang',Sang2,'ang',-Angle2);
19
    end
20
    b2=Line2D('MidLine');
21
   b2=AddCircle(b2,R2,a,1);
22
    b3=Line2D('InnerLine');
23
   b3=AddCircle(b3,R3,a,1);
24
    inputStruct.OutLine=b1;
25
    inputStruct.MidLine=b2;
26
    inputStruct.InnerLine=b3;
27
    inputStruct.BossHeight=100;
28
    inputStruct.PlateThickness=30;
29
    inputStruct.Meshsize=10;
30
    paramsStruct=struct();
31
   obj= plate.BossPlate(paramsStruct, inputStruct);
32
    obj= obj.solve();
33
   Plot3D(obj);
34
   f1=@(r)(sqrt(360^2-r.^2)-360);
35
    obj=DeformFace(obj,f1,1);
36 f2=@(r)(sqrt(360^2-r.^2)-360+30);
37
    obj=DeformFace(obj,f2,2);
38 Plot3D(obj);
```

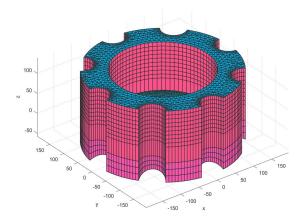
View face of elements





View face of elements



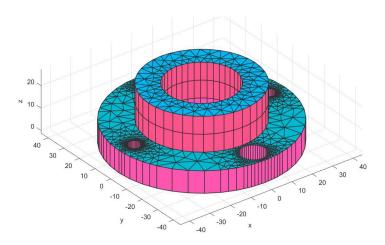


3.4 Add outer part holes (Flag=4)

设置InnerHole或者OuterHole可在对应区域打孔。

```
r1=81/2;
 2
    r2=52/2;
 3
    r3=32/2;
 4
    rp=66/2;
 5
    a=Point2D('Points assembly');
 6
    a=AddPoint(a,0,0);
 7
    b1=Line2D('OutLine');
 8
    b1=AddCircle(b1,r1,a,1);
 9
    b2=Line2D('MidLine');
10
   b2=AddCircle(b2,r2,a,1);
11
    b3=Line2D('InnerLine');
12
    b3=AddCircle(b3,r3,a,1);
13
14
    h1=Line2D('Hole');
15
    h2=Line2D('Hole');
16
    h3=Line2D('Hole');
17
    h4=Line2D('Hole');
18
19
    a=AddPoint(a,rp,0);
20
    a=AddPoint(a,0,rp);
21
    a=AddPoint(a,-rp,0);
22
    a=AddPoint(a,0,-rp);
23
24
    h1=AddCircle(h1,6.1/2,a,2);
25
    h2=AddCircle(h2,11.5/2,a,3);
26
    h3=AddCircle(h3,6.1/2,a,4);
27
    h4=AddCircle(h4,11.5/2,a,5);
28
    inputStruct.OutLine=b1;
29
    inputStruct.MidLine=b2;
30
    inputStruct.InnerLine=b3;
31
    inputStruct.BossHeight=16;
32
    inputStruct.PlateThickness=10;
33
   inputStruct.Meshsize=10;
```

```
inputStruct.OuterHole=[h1;h2;h3;h4];
paramsStruct.Type=1;
obj= plate.BossPlate(paramsStruct, inputStruct);
obj= obj.solve();
Plot3D(obj);
```



4 参考文献