TaperPMB

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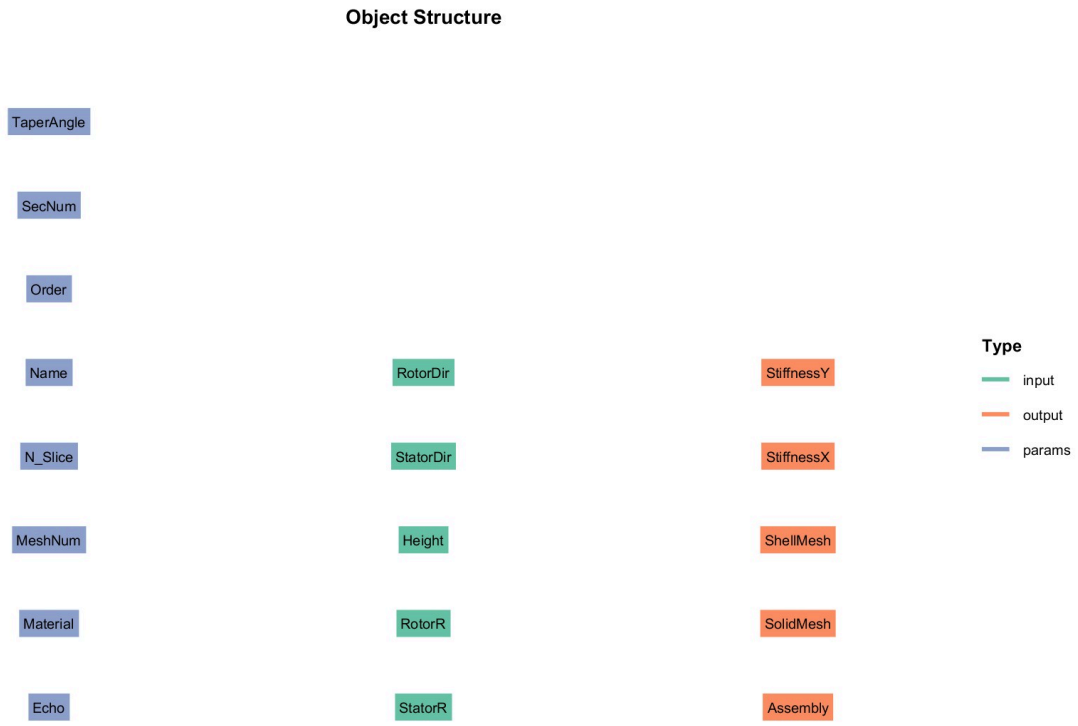
1 介绍

TaperPMB用于生成带锥角被动磁力轴承。

2 类结构



输入 input：

- RotorDir : 转子磁极方向
- StatorDir : 定子磁极方向
- Height : 高度
- RotorR : 转子半径
- StatorR: 定子半径

参数 params:

- SecNum： 刚度计算切片
- Order : 网格阶数
- Name : 名称
- N_Slice: 旋转方向划分数量
- Material : 材料
- MeshNum : 磁铁截面长宽方向网格数量
- TaperAngle : 锥角

输出 output :

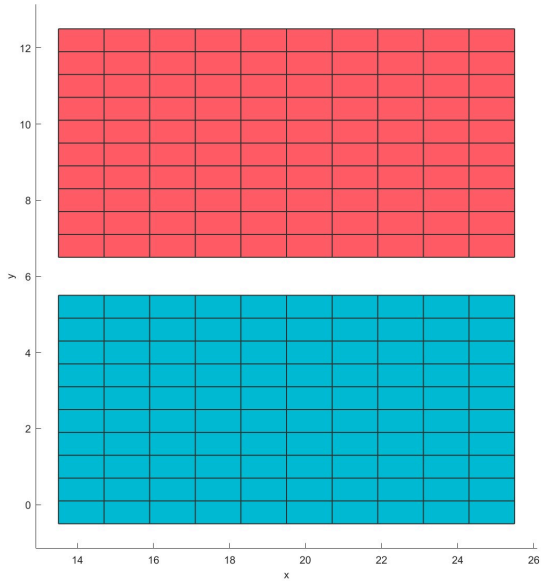
- StiffnessX : 径向刚度
- StiffnessY : 轴向刚度
- Assembly : 单元装配
- SolidMesh : 实体网格
- ShellMesh : 截面网格

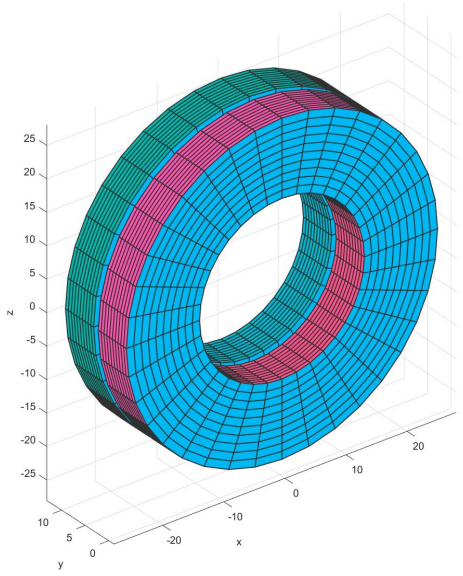
3 案例

3.1 Single row radial TaperPMB (Flag=1)

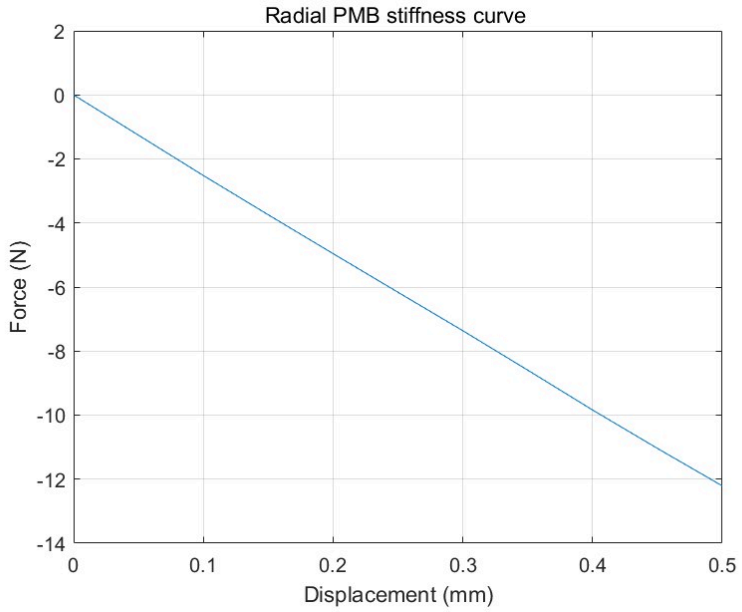
```
S=RMaterial('Magnetic');
Mat=GetMat(S,36);
Mat{1,1}.Mux=1.124;
Mat{1,1}.Muy=1.124;
Mat{1,1}.Hc=800000;

inputStruct1.StatorR=[20,26];
inputStruct1.RotorR=[13,19];
inputStruct1.Height=[0,12];
inputStruct1.StatorDir=180;
inputStruct1.RotorDir=0;
paramsStruct1.Material=Mat{1,1};
paramsStruct1.TaperAngle=90;

Mag= bearing.TaperPMB(paramsStruct1, inputStruct1);
Mag= Mag.solve();
Plot2D(Mag);
Plot3D(Mag);

Mag=CalMagneticField(Mag);
Mag = CalStiffnessX(Mag,'Displacement',0.5);
Mag = CalStiffnessY(Mag);
PlotStiffnessX(Mag)
PlotStiffnessY(Mag)
```

在Baffalo中建立被动磁力轴承，程序会调用FEMM计算磁场和刚度。

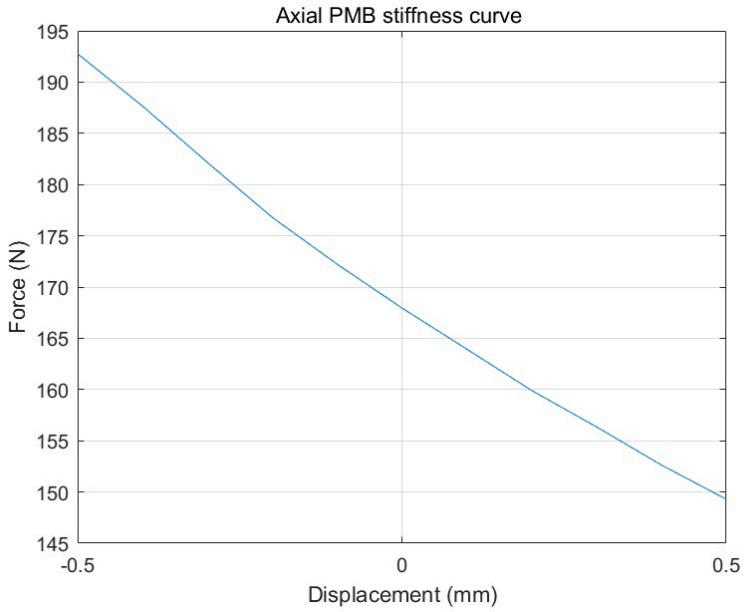

12
10
8
6
4
2
0
y
14
16
18
20
22
24
26
x


25
20
15
10
5
0
-5
-10
-15
-20
-25
z
10
5
0
y
-20
-10
0
10
20
x

径向刚度:

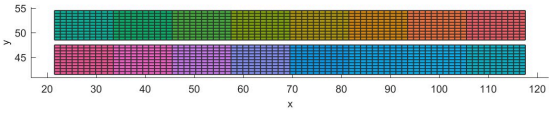

Radial PMB stiffness curve
2
0
-2
-4
-6
-8
-10
-12
-14
Force (N)
0
0.1
0.2
0.3
0.4
0.5
Displacement (mm)

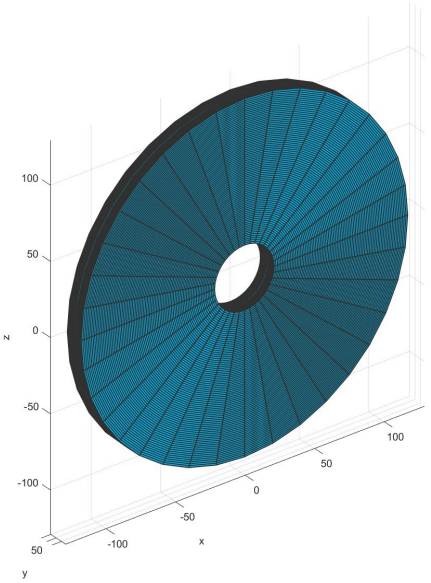
轴向刚度:

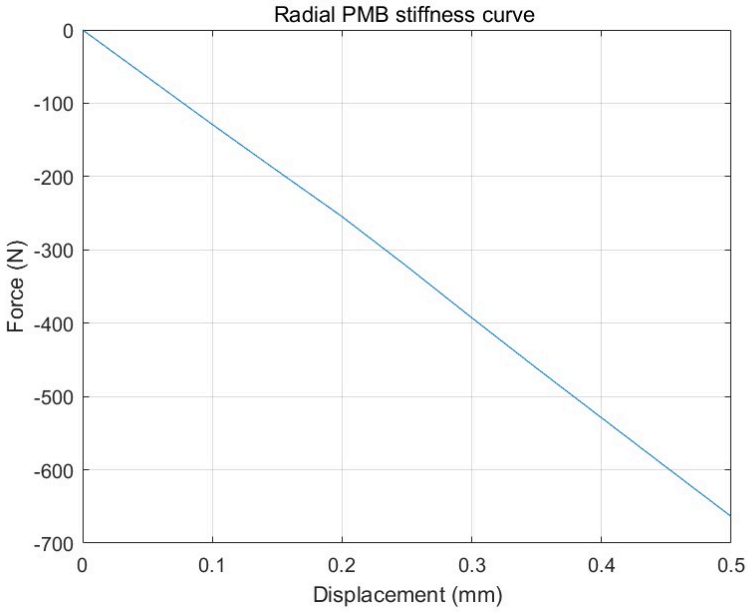


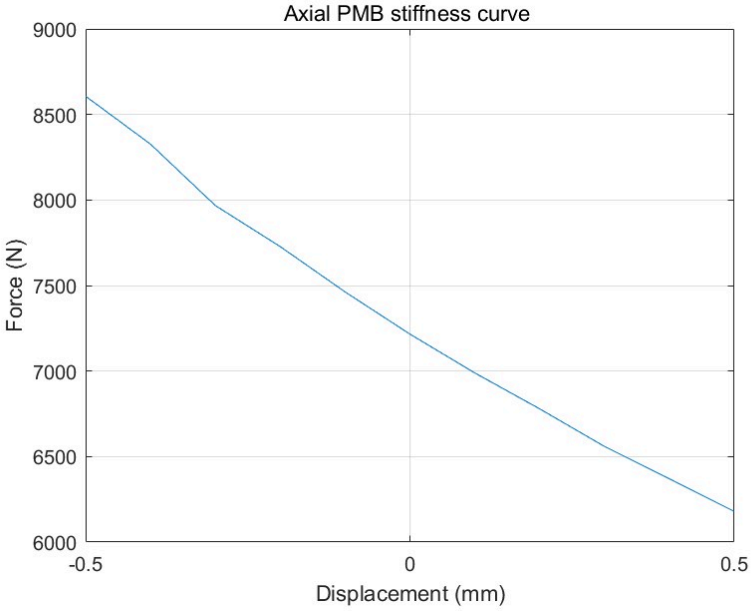
3.2 Multi row taper PMB (Flag=2)

```
S=RMaterial('Magnetic');
Mat=GetMat(S,36);
Mat{1,1}.Mux=1.124;
Mat{1,1}.Muy=1.124;
Mat{1,1}.Hc=800000;

inputStruct1.StatorR=[70,76];
inputStruct1.RotorR=[63,69];
inputStruct1.Height=[0,12,24,36,48,60,72,84,96];
inputStruct1.StatorDir=[180,0,180,0,180,0,180,0];
inputStruct1.RotorDir=[0,180,0,180,0,180,0,180];
paramsStruct1.Material=Mat{1,1};
paramsStruct1.TaperAngle=90;

Mag= bearing.TaperPMB(paramsStruct1, inputStruct1);
Mag= Mag.solve();
Plot2D(Mag);
Plot3D(Mag);

Mag=CalMagneticField(Mag);
Mag = CalStiffnessX(Mag,'Displacement',0.5);
Mag = CalStiffnessY(Mag);
PlotStiffnessX(Mag)
PlotStiffnessY(Mag)
```


55
50
45
y
20
30
40
50
60
70
80
90
100
110
120
x

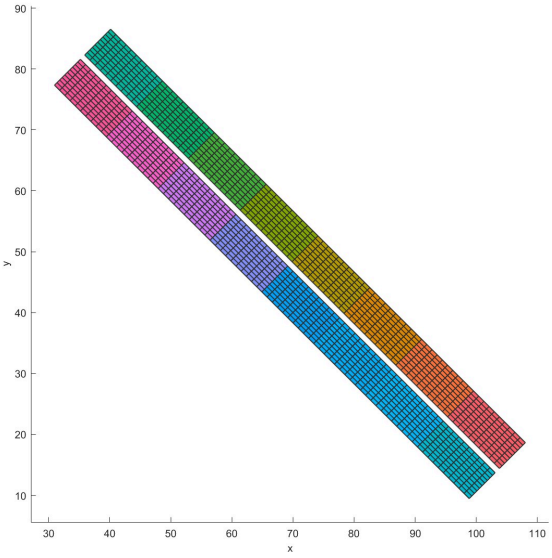

100
50
0
-50
-100
z
50
-100
-50
0
50
100
x
y

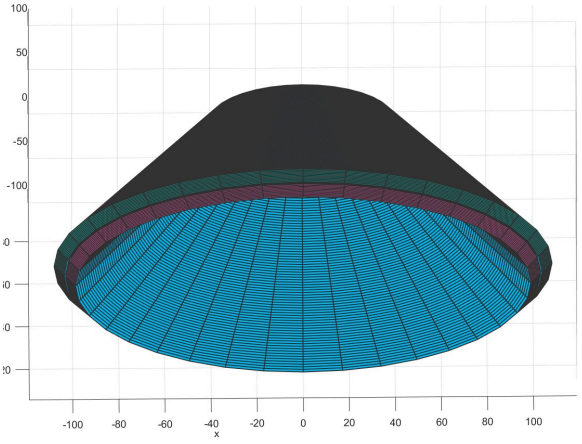

Radial PMB stiffness curve
0
-100
-200
-300
-400
-500
-600
-700
Force (N)
0
0.1
0.2
0.3
0.4
0.5
Displacement (mm)

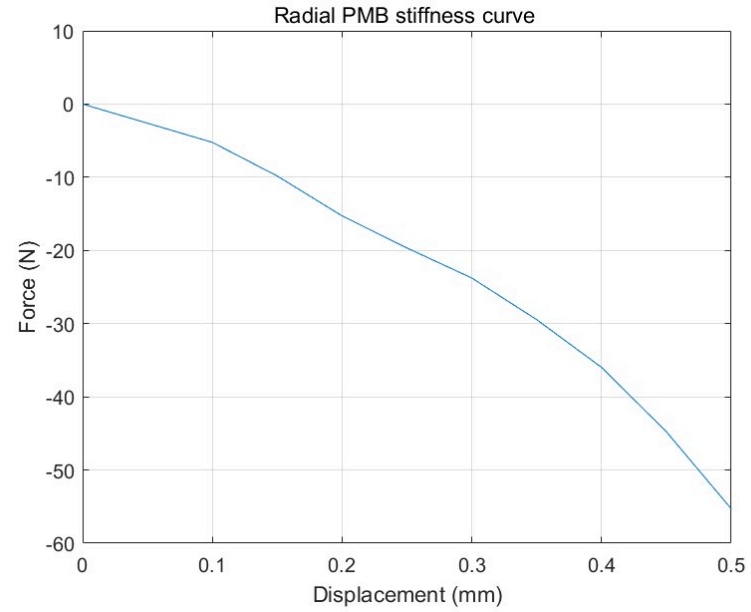

Axial PMB stiffness curve
9000
8500
8000
7500
7000
6500
6000
Force (N)
-0.5
0
0.5
Displacement (mm)

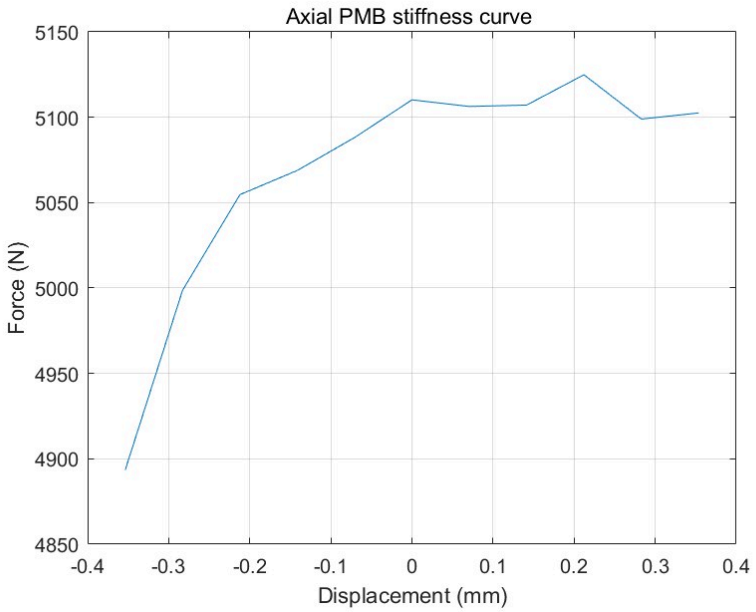
3.3 45° taper PMB (Flag=3)

```
S=RMaterial('Magnetic');
Mat=GetMat(S,36);
Mat{1,1}.Mux=1.124;
Mat{1,1}.Muy=1.124;
Mat{1,1}.Hc=800000;

inputStruct1.StatorR=[70,76];
inputStruct1.RotorR=[63,69];
inputStruct1.Height=[0,12,24,36,48,60,72,84,96];
inputStruct1.StatorDir=[180,0,180,0,180,0,180,0];
inputStruct1.RotorDir=[0,180,0,180,0,180,0,180];
paramsStruct1.Material=Mat{1,1};
paramsStruct1.TaperAngle=45;

Mag= bearing.TaperPMB(paramsStruct1, inputStruct1);
Mag= Mag.solve();
Plot2D(Mag);
Plot3D(Mag);

Mag=CalMagneticField(Mag);
Mag = CalStiffnessX(Mag,'Displacement',0.5);
Mag = CalStiffnessY(Mag);
PlotStiffnessX(Mag)
PlotStiffnessY(Mag)
```






Radial PMB stiffness curve
Force (N)
Displacement (mm)
10
0
-10
-20
-30
-40
-50
-60
0
0.1
0.2
0.3
0.4
0.5


Axial PMB stiffness curve
Force (N)
Displacement (mm)
5150
5100
5050
5000
4950
4900
4850
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4

4 参考文献