RadialPMB

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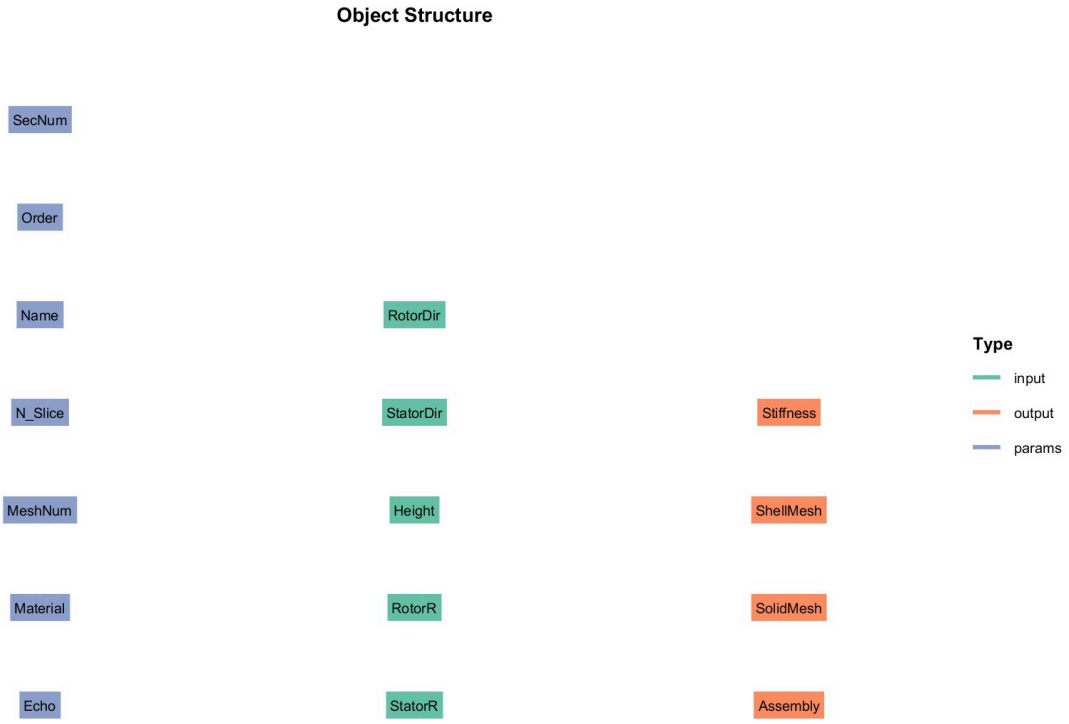
1 介绍

RadialPMB用于生成径向被动磁力轴承。

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

输出 output :

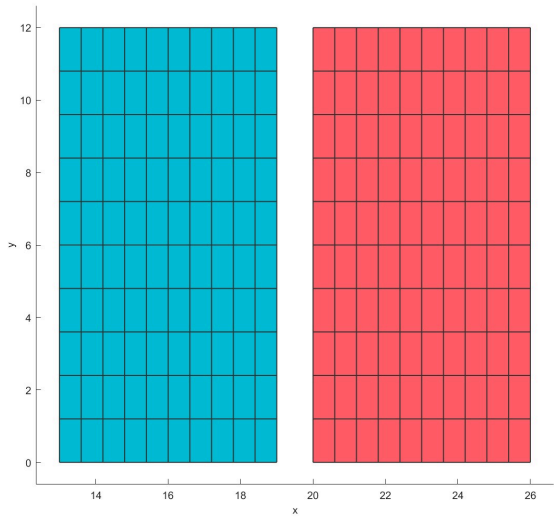
- Stiffness : 刚度
- Assembly : 单元装配
- SolidMesh : 实体网格
- ShellMesh : 截面网格

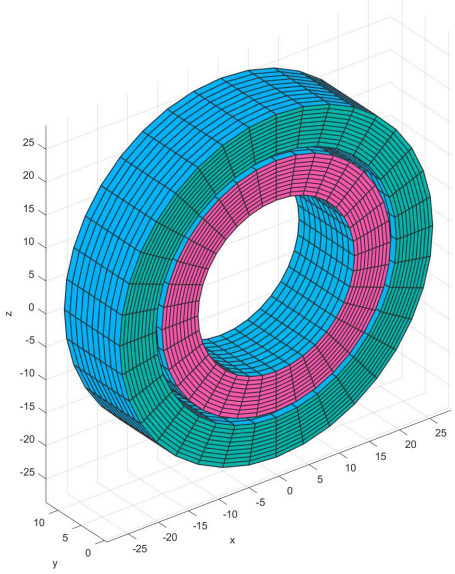
3 案例

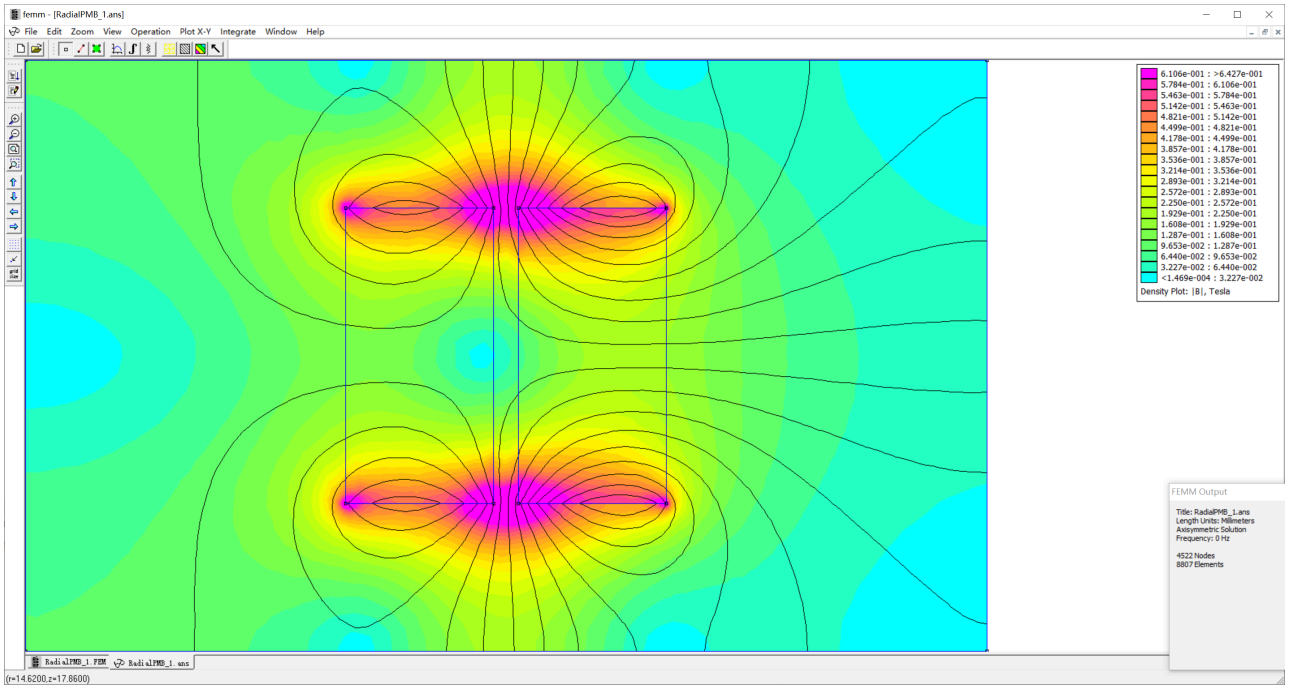
3.1 Single row radial PMB (Flag=1)

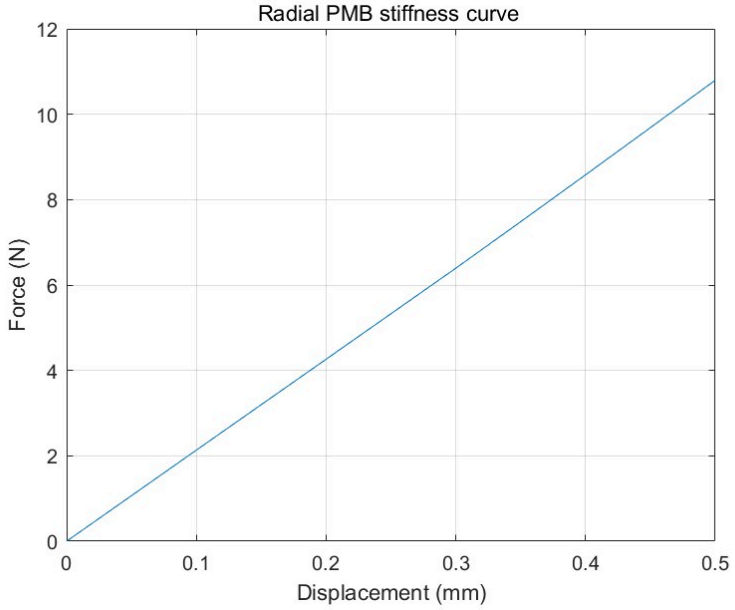
```
S=RMaterial('Magnetic');
Mat=GetMat(S,36);
Mat{1,1}.Mux=1.124;
Mat{1,1}.Muy=1.124;
Mat{1,1}.Hc=800000;

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

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

Mag = CalStiffness(Mag);
PlotStiffness(Mag)
```

在Baffalo中建立双环单列被动磁力轴承，程序会调用FEMM计算磁场和刚度。





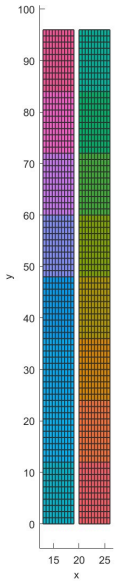


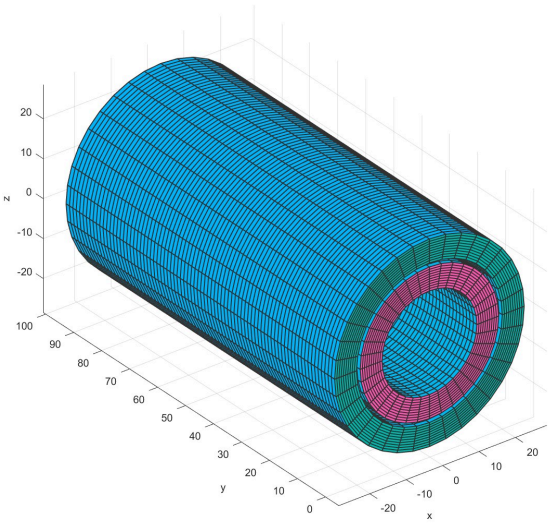


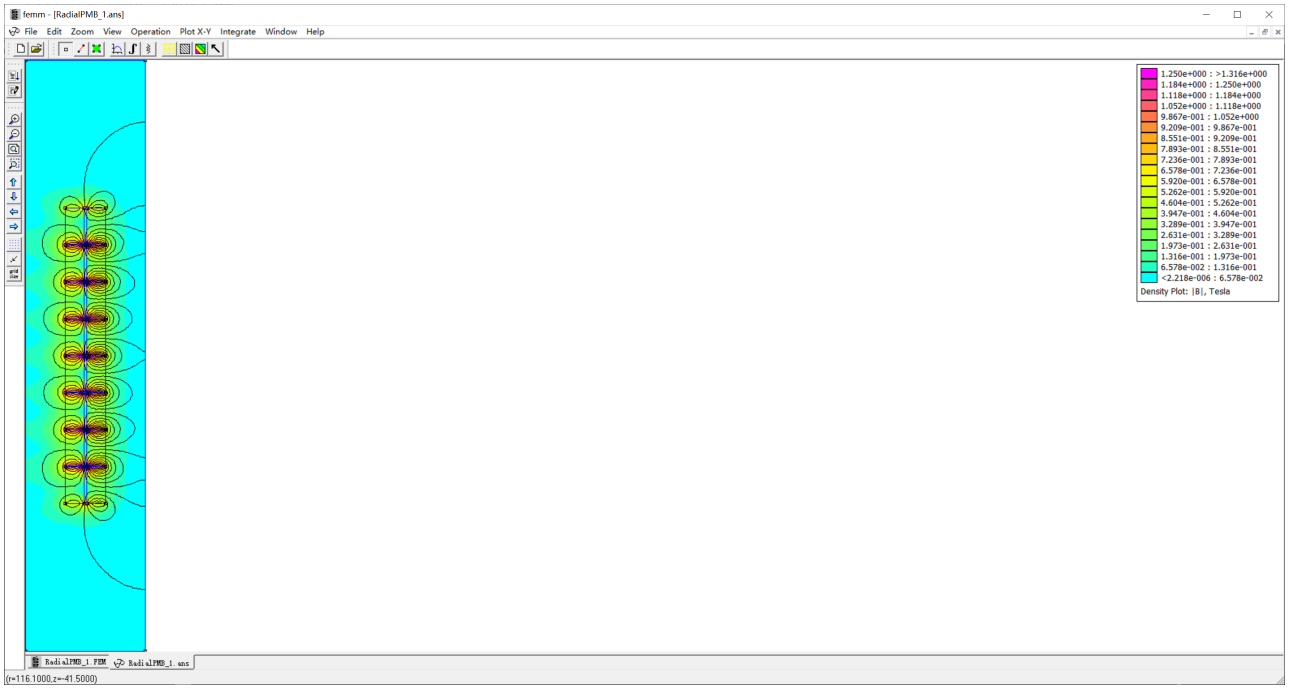
3.2 Multi row radial PMB (Flag=2)

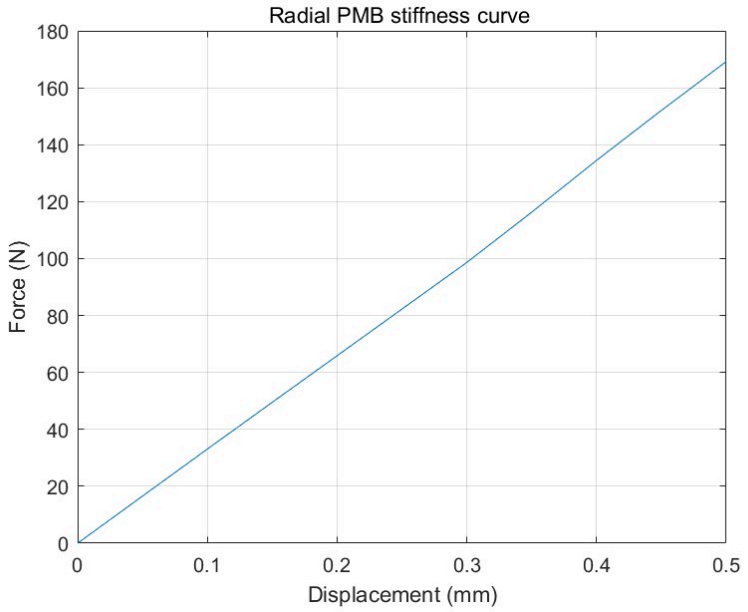
```
S=RMaterial('Magnetic');
Mat=GetMat(S,36);
Mat{1,1}.Mux=1.124;
Mat{1,1}.Muy=1.124;
Mat{1,1}.Hc=800000;

inputStruct1.StatorR=[20,26];
inputStruct1.RotorR=[13,19];
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};

Mag= bearing.RadialPMB(paramsStruct1, inputStruct1);
Mag= Mag.solve();
Plot2D(Mag);
```

```
Plot3D(Mag);

Mag=CalMagneticField(Mag);
Mag = CalStiffness(Mag);
PlotStiffness(Mag)
```



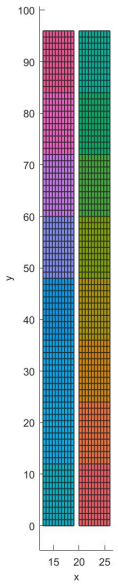


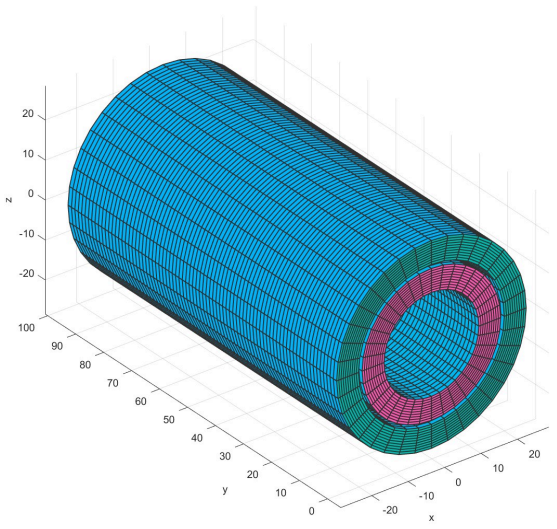


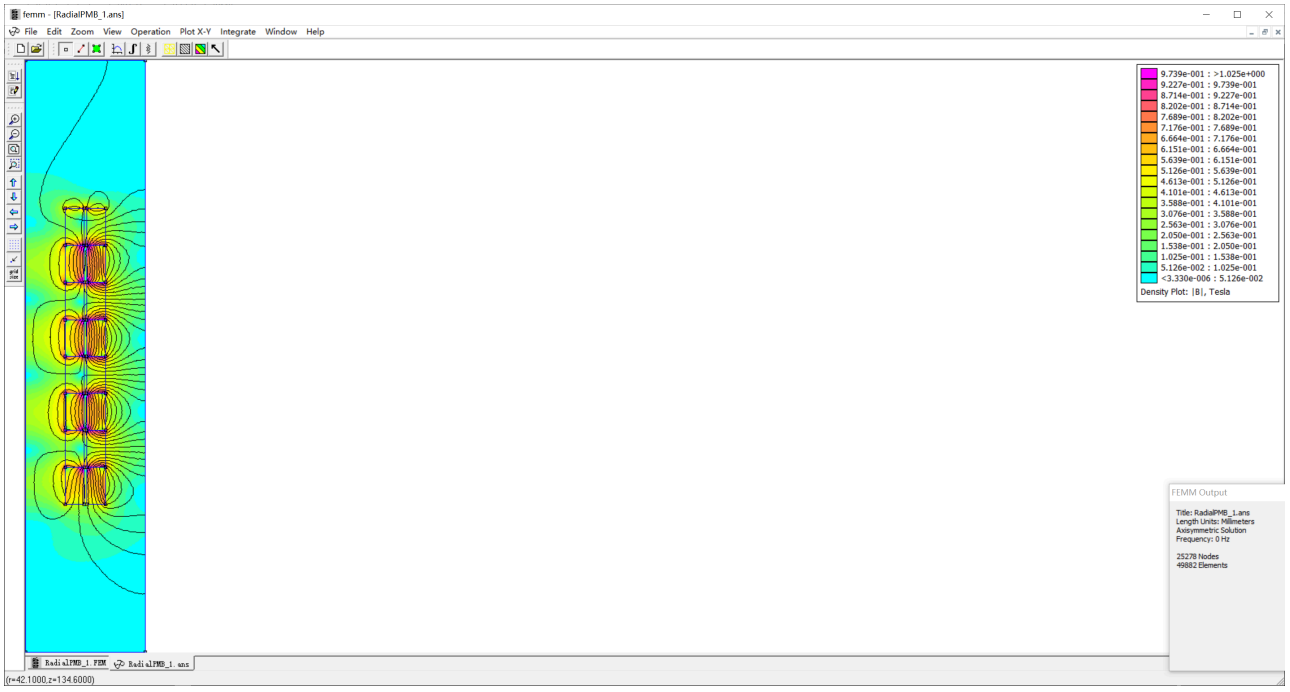


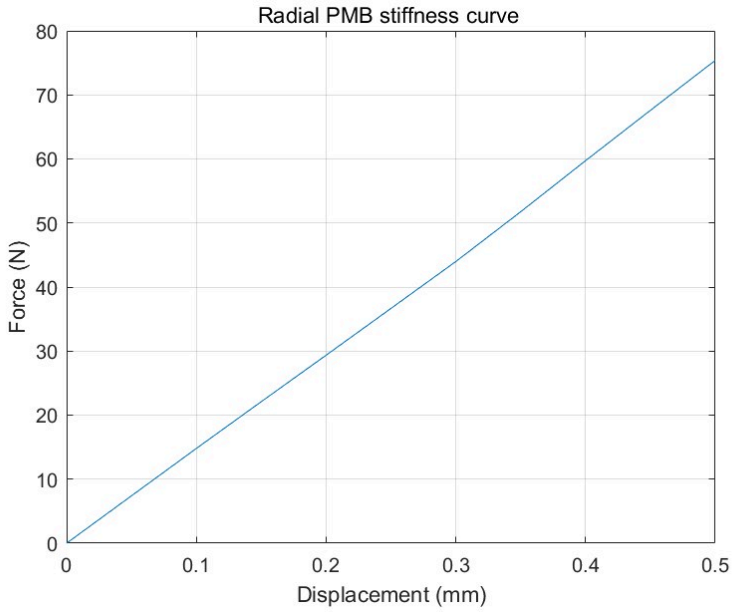
3.3 Halbach radial PMB (Flag=3)

```
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=[20,26];
inputStruct1.RotorR=[13,19];
inputStruct1.Height=[0,12,24,36,48,60,72,84,96];
inputStruct1.StatorDir=[-90,180,90,0,-90,180,90,0];
inputStruct1.RotorDir=[-90,0,90,180,-90,0,90,180];
paramsStruct1.Material=Mat{1,1};

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

Mag=CalMagneticField(Mag);
Mag = CalStiffness(Mag);
PlotStiffness(Mag)
```


100
90
80
70
60
50
40
30
20
10
0
y
15
20
25
x


20
10
0
-10
-20
z
100
90
80
70
60
50
40
30
20
10
0
y
-20
-10
0
10
20
x


femm - [RadialPMB_1.ans]
File Edit Zoom View Operation Plot X-Y Integrate Window Help
9.739e-001 : >1.025e+000
9.227e-001 : 9.739e-001
8.714e-001 : 9.227e-001
8.202e-001 : 8.714e-001
7.689e-001 : 8.202e-001
7.176e-001 : 7.689e-001
6.664e-001 : 7.176e-001
6.151e-001 : 6.664e-001
5.639e-001 : 6.151e-001
5.126e-001 : 5.639e-001
4.613e-001 : 5.126e-001
4.101e-001 : 4.613e-001
3.588e-001 : 4.101e-001
3.076e-001 : 3.588e-001
2.563e-001 : 3.076e-001
2.050e-001 : 2.563e-001
1.538e-001 : 2.050e-001
1.025e-001 : 1.538e-001
5.126e-002 : 1.025e-001
<3.330e-006 : 5.126e-002
Density Plot: |B|, Tesla
FEMM Output
Title: RadialPMB_1.ans
Length Units: Millimeters
Axisymmetric Solution
Frequency: 0 Hz
25278 Nodes
49882 Elements
RadialPMB_1.FEM
RadialPMB_1.ans
(r=42.1000,z=134.6000)


Radial PMB stiffness curve
Force (N)
Displacement (mm)
0
10
20
30
40
50
60
70
80
0
0.1
0.2
0.3
0.4
0.5

4 参考文献