HertzContact

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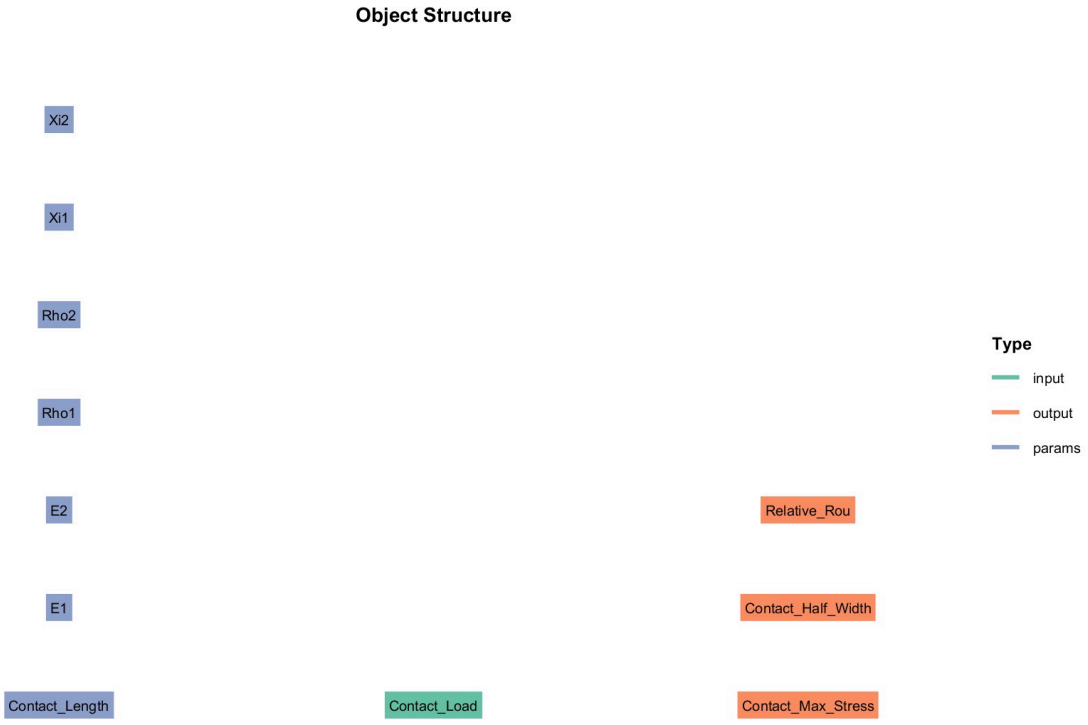
1 介绍

HertzContact包含三个模块，圆柱与圆柱接触，球与球接触和圆柱与圆柱接触下的此表面应力计算。

2 类结构

2.1 Hertz_Contact_Ball2Ball



输入 input：

- Contact : 接触力

参数 params:

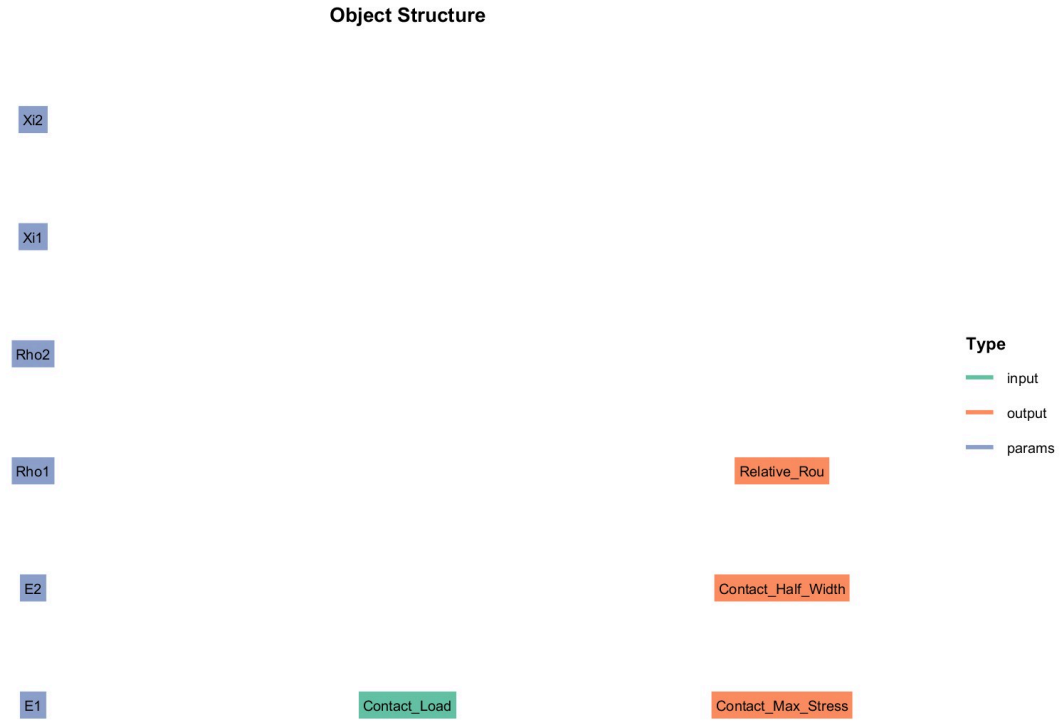
- Xi2 : Body2泊松比
- Xi1 : Body1泊松比
- Rho2 : Body2半径
- Rho1 : Body1半径
- E2 : Body2弹性模量
- E1 : Body1弹性模量
- Contact_Length : 圆柱体接触长度

输出 output :

- Relative_Rou : 综合曲率半径

- Contact_Half_Widh : 接触半宽
- Contact_Max_Stress : 最大接触压力

2.2 Hertz_Contact_Cyclinder2Cyclinder



输入 input：

- Contact : 接触力

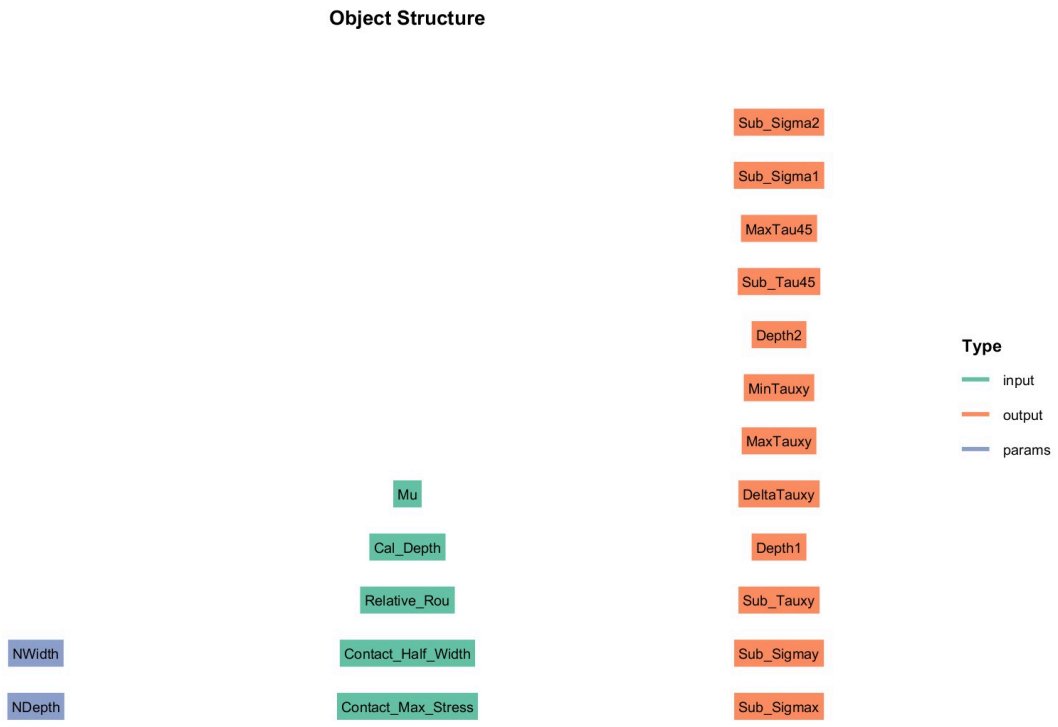
参数 params:

- Xi2 : Body2泊松比
- Xi1 : Body1泊松比
- Rho2 : Body2半径
- Rho1 : Body1半径
- E2 : Body2弹性模量
- E1 : Body1弹性模量

输出 output :

- Relative_Rou : 综合曲率半径
- Contact_Half_Widh : 接触半宽
- Contact_Max_Stress : 最大接触压力

2.3 Sub_Surface_Stress



输入 input：

- Mu : 摩擦系数
- Cal_Depth : 计算深度
- Relative_Rou : 综合曲率半径
- Contact_Half_Width : 接触半宽
- Contact_Max_Stress : 最大接触应力

参数 params:

- NWidth : 宽度上划分
- NDepth : 深度上划分

输出 output :

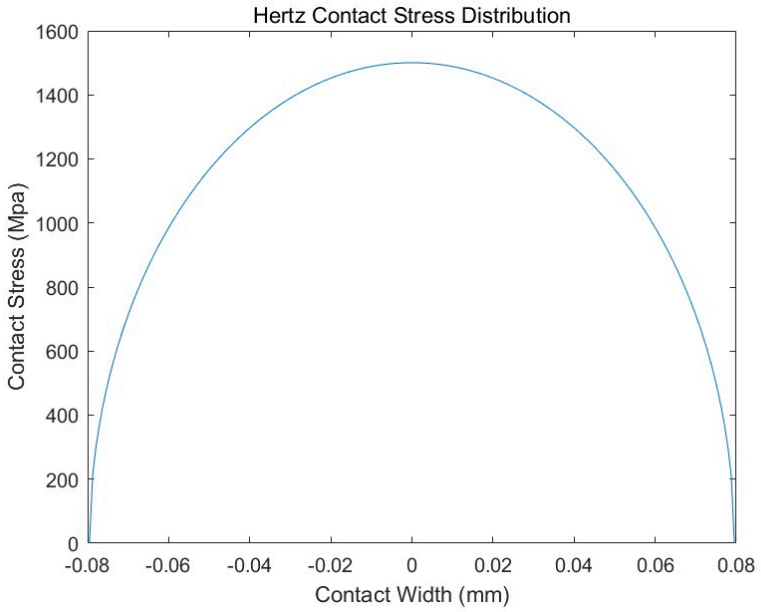
- Sub_Sigma2 : 次表面Sigma2
- Sub_Sigma1 : 次表面Sigma1
- MaxTau45 : 最大主剪应力
- Sub_Tau45 : 次表面Tau45
- Depth2 : 最大主剪应力对应深度
- MinTauxy : 最小剪应力
- MaxTauxy : 最大剪应力
- DeltaTauxy ：剪应力差值
- Depth1 : 最大剪应力对应层深
- Sub_Tauxy : 次表面剪应力
- Sub_Sigmay : 次表面Sigmay

- Sub_Sigmax : 次表面Sigmax

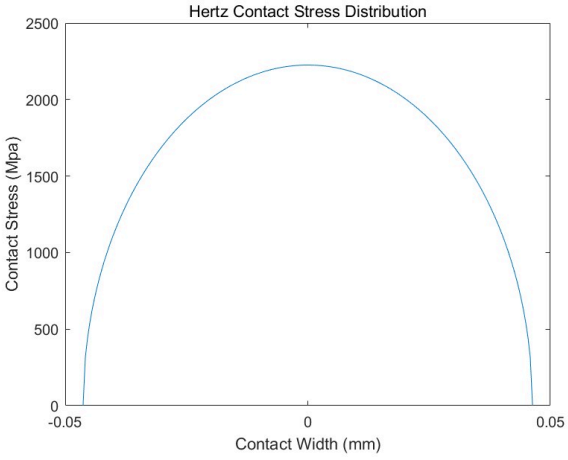
3 案例

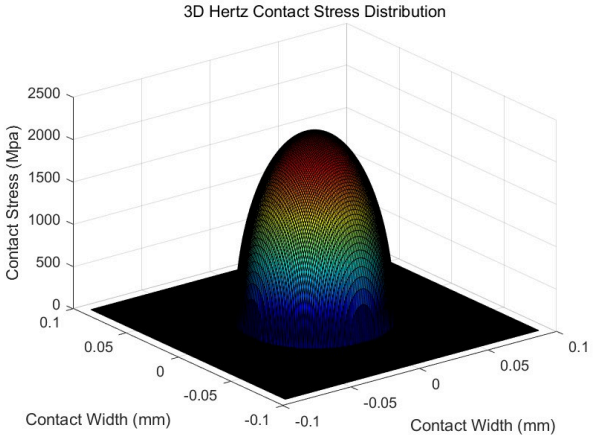
```
%% Test Hertz_Contact_Cyclinder2Cyclinder
paramsStruct1.Contact_Length = 8;
paramsStruct1.E1 = 2.06e5;
paramsStruct1.E2 = 2.06e5;
paramsStruct1.Xi1 = 0.3;
paramsStruct1.Xi2 = 0.3;
paramsStruct1.Rho1 = 6;
paramsStruct1.Rho2 = 6;

inputStruct1.Contact_Load = 1500;
obj1 = method.Hertz_Contact.Hertz_Contact_Cyclinder2Cyclinder(paramsStruct1,
inputStruct1);
obj1 = obj1.solve();
PlotPressure(obj1);
%% Test Hertz_Contact_Ball2Ball
paramsStruct2.E1 = 2.06e5;
paramsStruct2.E2 = 2.06e5;
paramsStruct2.Xi1 = 0.3;
paramsStruct2.Xi2 = 0.3;
paramsStruct2.Rho1 = 3;
paramsStruct2.Rho2 = 3;

inputStruct2.Contact_Load = 10;
obj2 = method.Hertz_Contact.Hertz_Contact_Ball2Ball(paramsStruct2, inputStruct2);
obj2= obj2.solve();
PlotPressure(obj2);
PlotPressure3D(obj2);
%% Test Sub_Surface_Stress
inputStruct3.Contact_Max_Stress = obj1.output.Contact_Max_Stress ;
inputStruct3.Contact_Half_Width = obj1.output.Contact_Half_Width;
inputStruct3.Relative_Rou = obj1.output.Relative_Rou;
inputStruct3.Cal_Depth = 0.5;
inputStruct3.Mu = 0;
% inputStruct3.Mu = 0.1;
% inputStruct3.Mu = 0.3;
paramsStruct3=struct();
obj3 = method.Hertz_Contact.Sub_Surface_Stress(paramsStruct3, inputStruct3);
obj3= obj3.solve();
PlotTauxy(obj3);
PlotTau45(obj3)
DrawStress(obj3,'Stress','Tauxy')
DrawStress(obj3,'Stress','Sigmax')
DrawStress(obj3,'Stress','Sigmay')
DrawStress(obj3,'Stress','Sigma1')
DrawStress(obj3,'Stress','Sigma2')
DrawStress(obj3,'Stress','Tau45')
```

圆柱与圆柱接触:

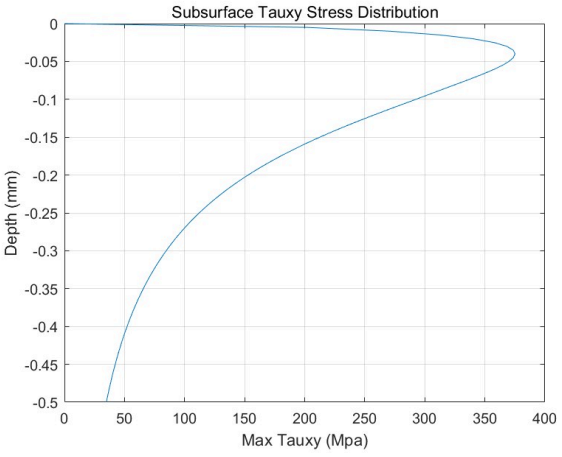


球与球接触：

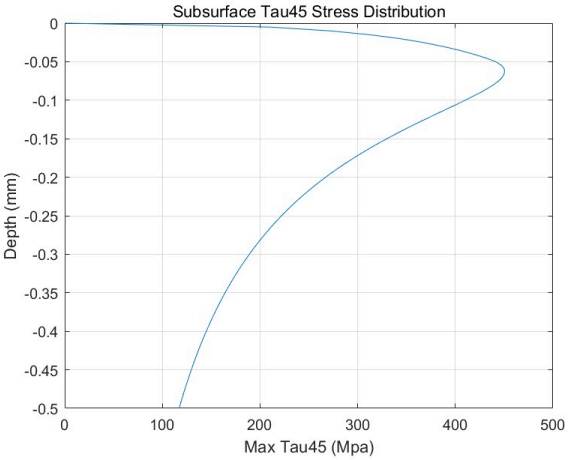




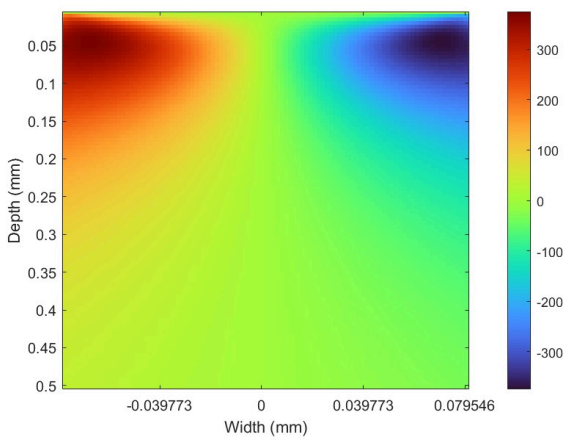
次表面应力分布：



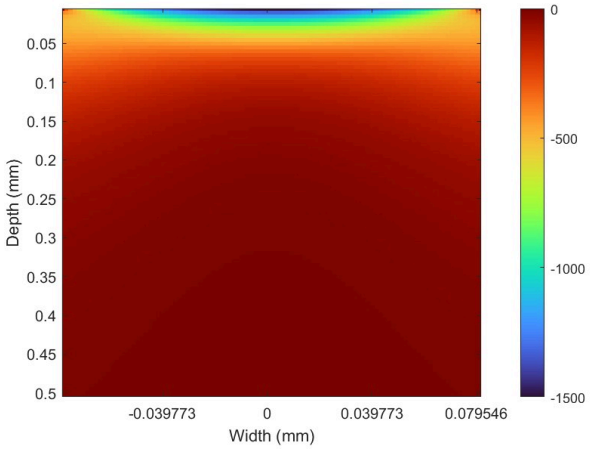
Tauxy



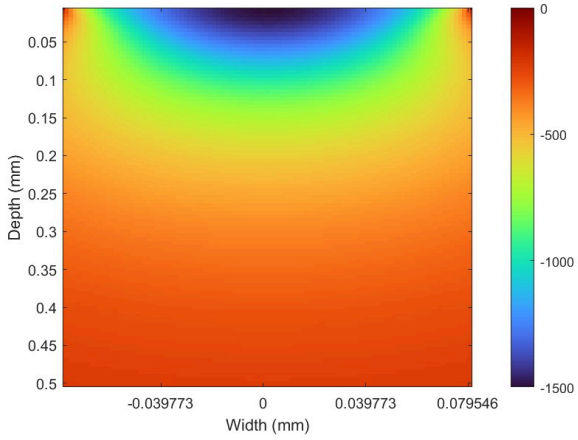
Tau45



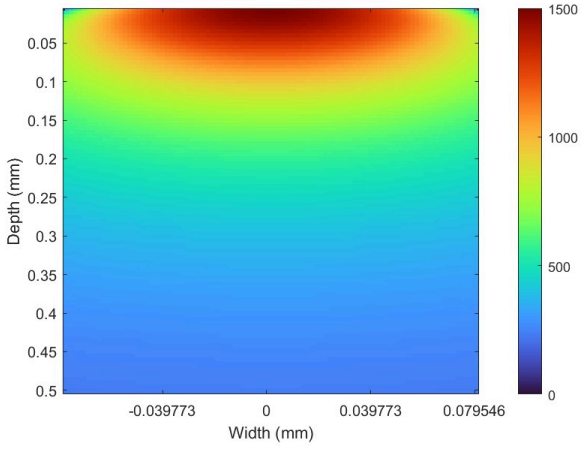
Tauxy



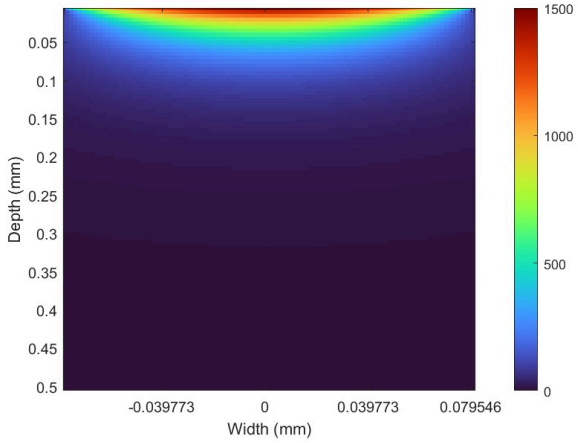
Sigmax



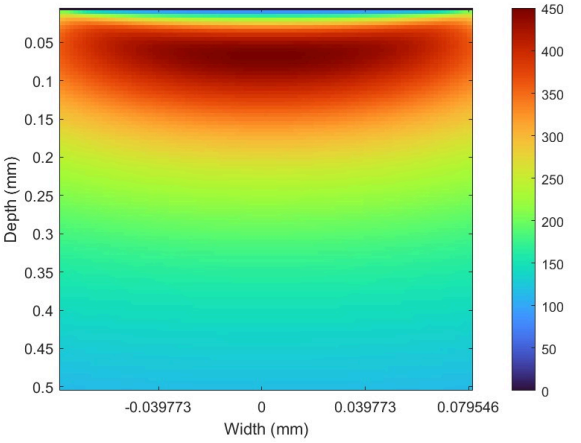
Sigmay



Sigma1

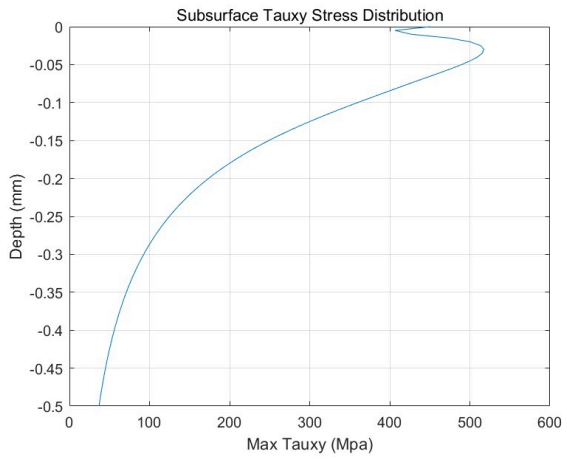


Sigma2

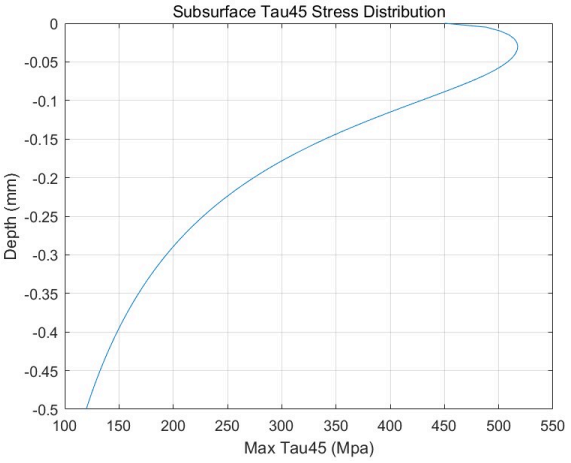


Tau45

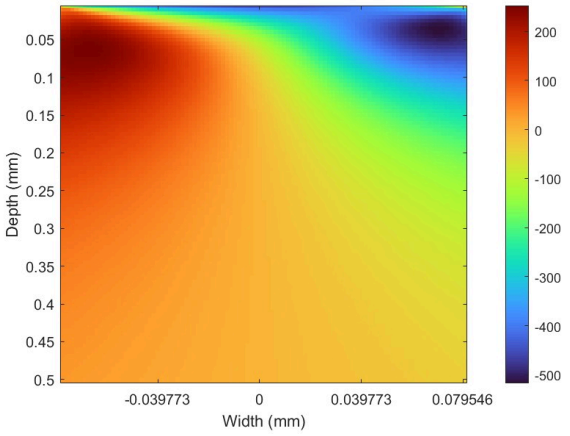
考虑摩擦力后的次表面应力：



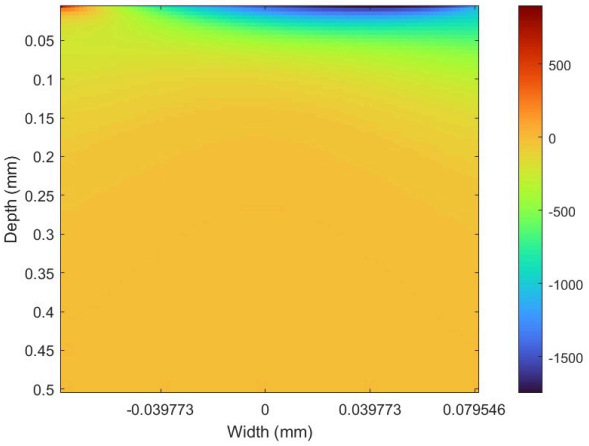
Tauxy



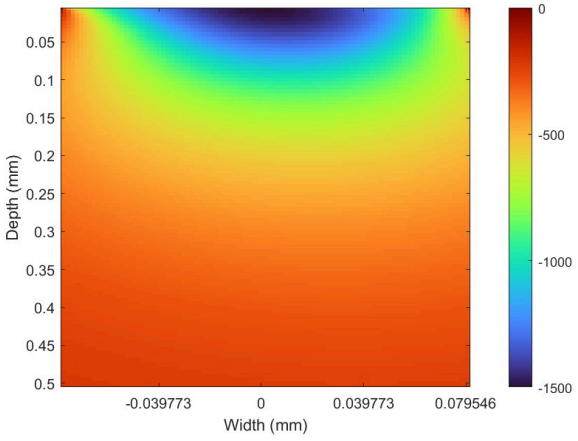
Tau45



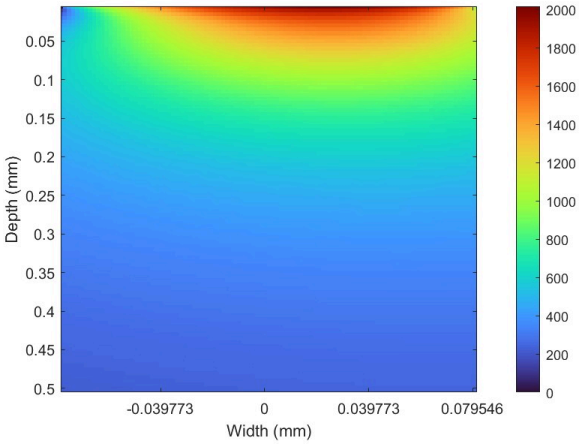
Tauxy



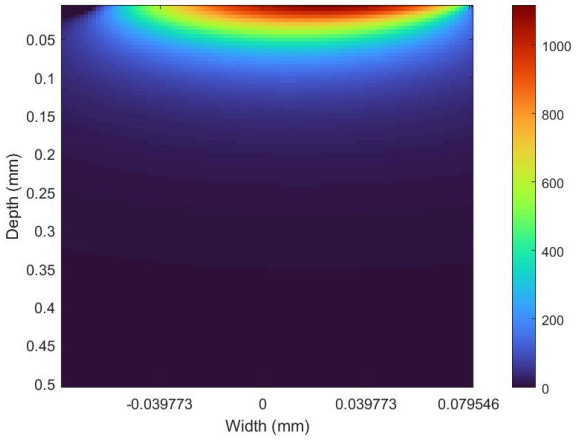
Sigmax



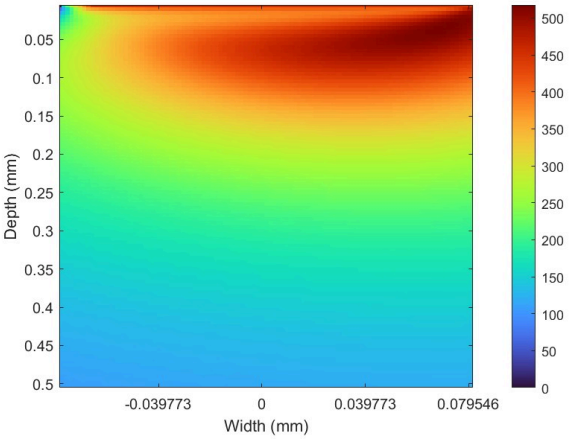
Sigmay



Sigma1



Sigma2



Tau45

4 参考文献