MATLAB三维作图——隐函数

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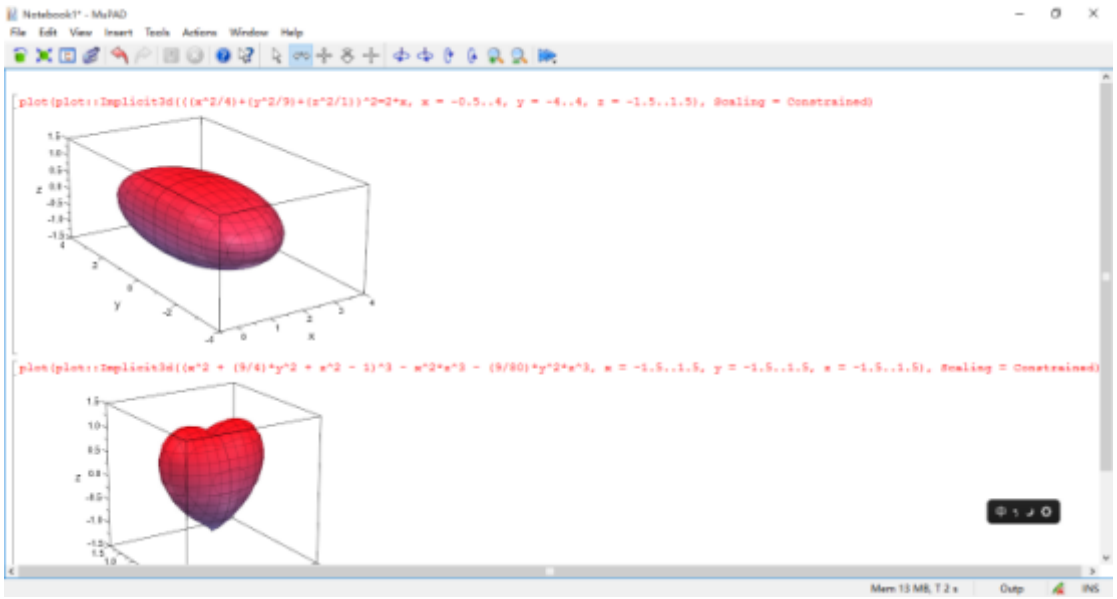
对于三维隐函数，没有显式表达式，无法通过Matlab现成的3-D画图函数 surf 或 mesh画图。可以通过三种办法解决：

1. Mupad符号引擎里提供了三维隐函数画图函数

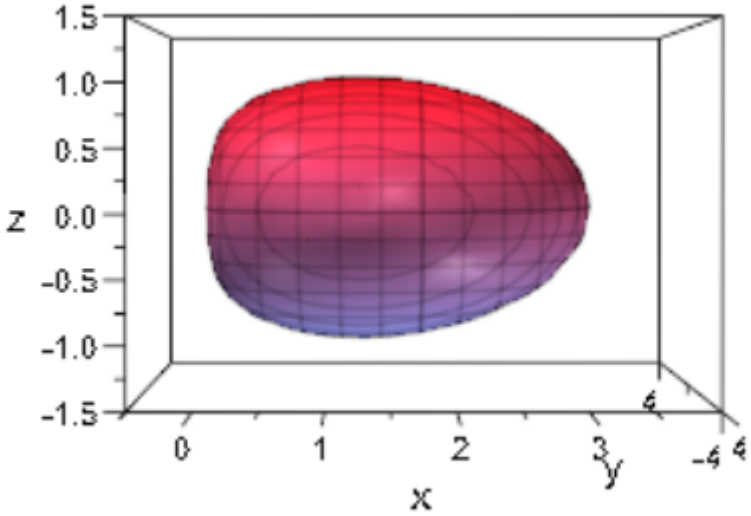
在matlab里开启Mupad的方法是：在command window 里输入 mupad 来启动一个notebook。



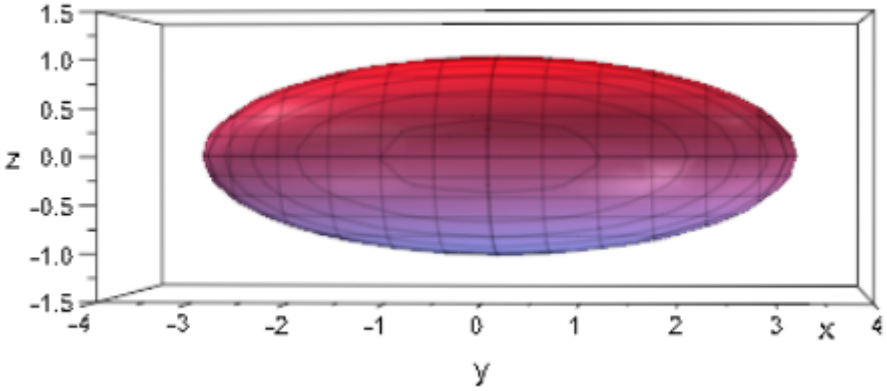
在启动的notebook里再输入如下代码：

```
plot(plot::Implicit3d(((x^2/4)+(y^2/9)+(z^2/1))^2=2*x, x = -0.5..4, y = -4..4, z = -1.5..1.5), Scaling = Constrained)
```

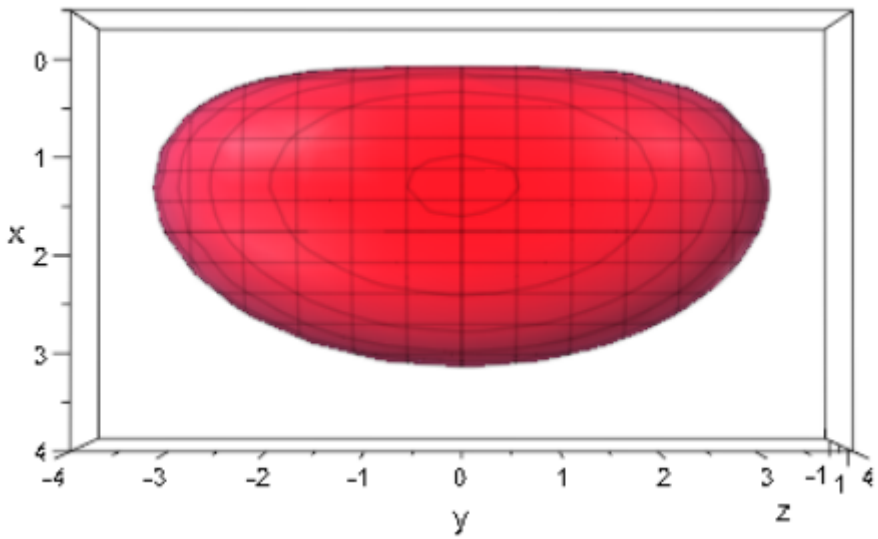
从xoy面看：



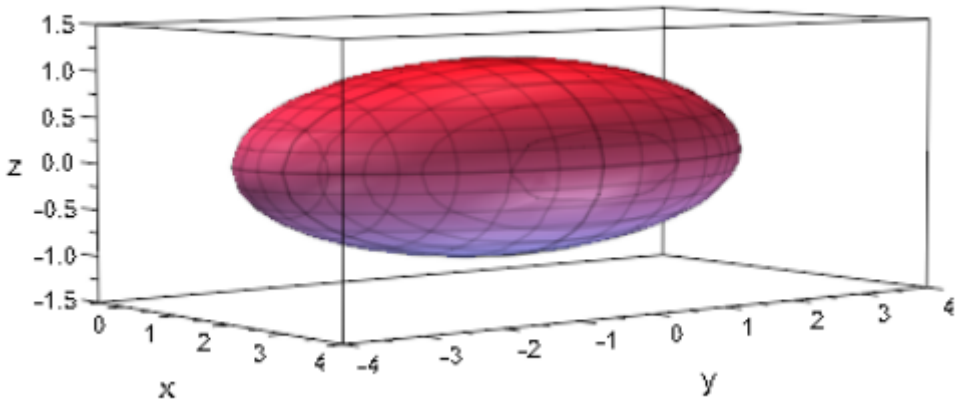
从yoz面看：



从xoy面看：

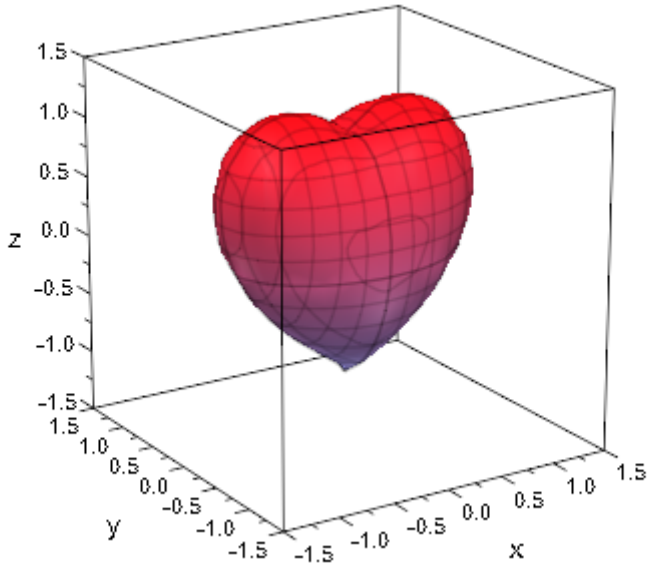


((x^2/4)+(y^2/9)+(z^2/1))^2=2*x的图像:



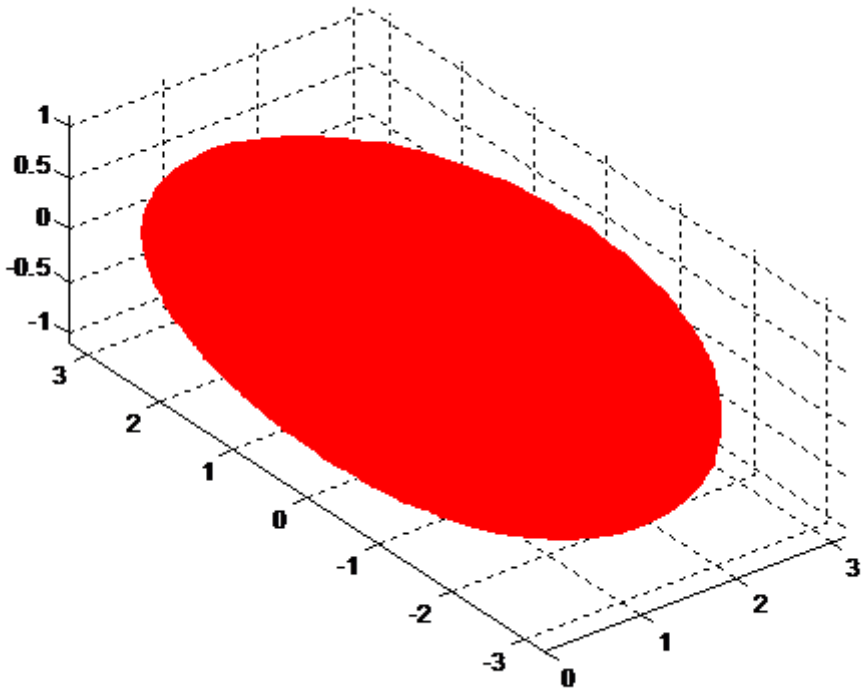
例2：

```
plot(plot::Implicit3d((x^2 + (9/4)*y^2 + z^2 - 1)^3 - x^2*z^3 - (9/80)*y^2*z^3, x = -1.5..1.5, y = -1.5..1.5, z = -1.5..1.5), Scaling = Constrained)
```



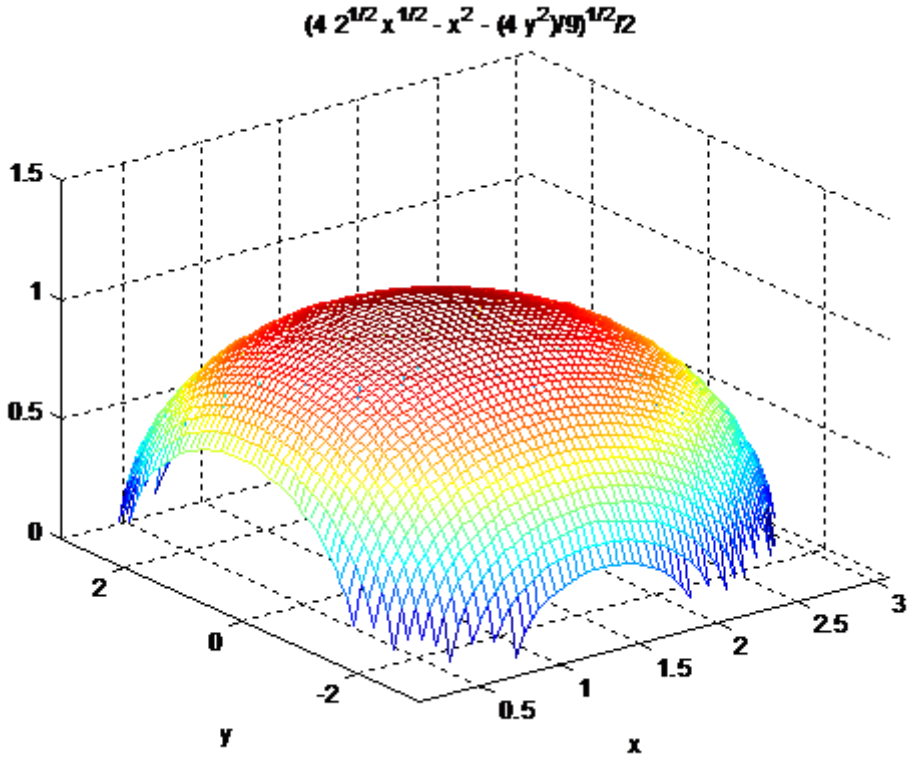
2.再给一种只调用matlab的方法

```
figure
[x,y,z] = meshgrid(-0.5:0.05:4,-4:0.05:4,-1.5:0.05:1.5);
v =((x.^2/4)+(y.^2/9)+(z.^2/1)).^2-2.*x;
p = patch(isosurface(x,y,z,v,0),'FaceColor','r','EdgeColor','none');
isonormals(x,y,z,v,p)
view(3)
camlight
lighting gouraud
axis equal tight
grid on
```



3.先求解z，在画图

```
>> z=solve('((x^2/4)+(y^2/9)+(z^2/1))^2-2*x','z')
ezmesh(z(1))
```


(4 2^1/2 x^1/2 - x^2 - (4 y^2)y9)^1/2/2
1.5
1
0.5
0
2
0
-2
y
0.5
1
1.5
2
2.5
3
x