

Graphique 3D

```
>> edit plotting3D.m
>> |
```

Command Window

GUI

Current Directory: /Users/moocadmin/IntroductionOctave

Experimental GUI Info

Editor

1 figure(2)|

2

MATLAB et Octave pour débutants

We can also make three-dimensional graphics. For a 3D graphic, i open a new script. OK. So I open a new empty script that I call plotting3D.m and it's already empty. And then I want to open a new figure so now I call it figure 2. So I imagine that have first the figure 1 and then I want a separate window for a second figure and this is how I name it.

Notes

Summary

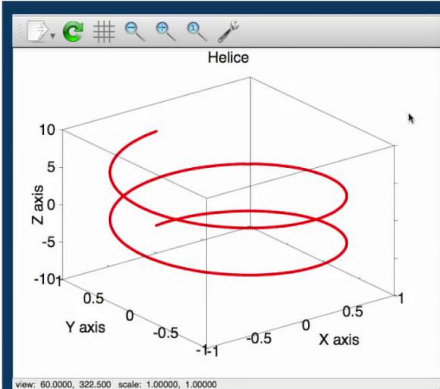


0m 05s

3D graphics

```
>> plotting3D
>> plotting3D
>> plotting3D
>>
```

Command Window



Graphique

```
1 figure(2)
2
3 t = linspace(-2*pi, 2*pi, 200);
4
5 plot3(sin(t), cos(t), t, 'b-');
6 title('Helice')
7 xlabel('X axis')
8 ylabel('Y axis')
9 zlabel('Z axis')
10
11 plot3(sin(t), -cos(t), t, 'b-');
```

GUI

MATLAB and Octave for beginners

And then I want to try draw a parametric curve. So for a parametric curve I need a parameter 't' which is vector equally distributed between -2π until 2π and that will use 200 points here. OK. So I can draw my parametric curve using 200 points. Now I would like to draw an Alice. So what is the function that allows me to do that so I have 't' then sine of 't' and cosine of 't' and then I will like to use some colors for my curve. So here for example blue with lines, with a continuous line then I can run this script and I see my Alice. Now I give a title and then I can name the labels, have the label X, Y and Z. So this is exactly the same as in 2D but instead of having 2 axes, I have 3 axes. And then I can save and run the script again. What does mean that we have three data, three vectors t, sin t, cos t? So these are the vectors with the 3 coordinates. Now if I want to turn my Alice around, I switch the 't'. Instead of the in front I put it in the end. I execute the script and I see that the figure has turned. If I want to put a second Alice I can copy paste this line. OK now I want to plot a new one. So instead of doing with one single plot command I do two plot commands.

Notes

Summary

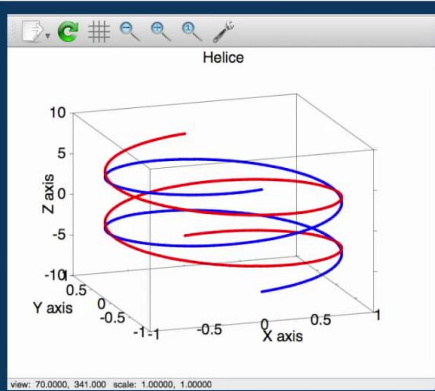


0m 34s

3D graphics

```
>> plotting3D
>> plotting3D
>> plotting3D
>> plotting3D
>> plotting3D
>> |
```

Command Window



Graphique

```
1 figure(2)
2
3 t = linspace(-2*pi, 2*pi, 200);
4
5 plot3(sin(t), cos(t), t, 'b-');
6 title('Helice')
7 xlabel('X axis')
8 ylabel('Y axis')
9 zlabel('Z axis')
10
11 hold on
12 plot3(sin(t), -cos(t), t, 'k-');
13
14 saveas(gca, 'plot3D.jpg', 'jpg');
```

GUI

MATLAB and Octave for beginners

I I change the color. By the way here I said before blue but it comes out red OK. So it is my old octave version. So now I say I would like the new plot to be in black and what happened is that my first figure is gone and to keep the two plots I have to say hold on. So I plot for the first time and I say hold on and now I have the two graphics. So the two curves in my graphic. Without the hold on the second plot command will squash the first one. Again I can save my figure. And the command is exactly the same as before, 'save as', then the current figure so as GCA and then a file name and after the file name I have to say the format that I use. It is indeed jpg here. So I have to say jpg format and then I can run the script and then we'll have both my figure and my file ready for some presentation.

Notes

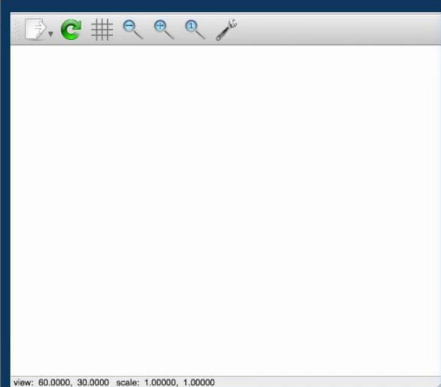
Summary



3m 01s

Surface in 3D

```
>> edit surface
surface      surfacePlot.m
surfacePlot
>> edit surfacePlot.m
>> |
```



view: 60.0000, 30.0000 scale: 1.00000, 1.00000

Command Window

GUI

```
1 clf % clear current figure
2
3 x = linspace(-1,1,101);
4 y = linspace(-1,1,201);
5 [
6
7
```

MATLAB and Octave for beginners

So instead of a curve now I want to make a surface. I use the command `surface`. If you want to know what it is well, type `AB surface`. Then I can edit 'mySurfacePlot' That is a new script. And in this script I will clear the current figure so I will use this latest figure that I used but I want to clear it. So 'clf' means clear current figure. So that I don't have to open a new one. But I can use the last one and just clear it. So when I do a surface I actually need 2 parameters. We will make a curve with these two parameters representing the axes X and Y. And then I define the edge of the surface with respect to this X and Y. And that makes the third coordinate. So in the X-direction I take a `linspace` from -1 to 1 and I take 101 points in the direction Y. I also take `linspace` and now I take from -1 to 1 but with 200 points. So it's a square the same square but discretized differently in one direction and in the other. I want also to use different sizes so that if I do mistakes by mixing up X and Y I can already see that there is a mismatch of the sizes. So now I have to create a grid that represents all the points that I want to draw in my surface. To generate it I use the command `mesh` grid.

Notes

Summary

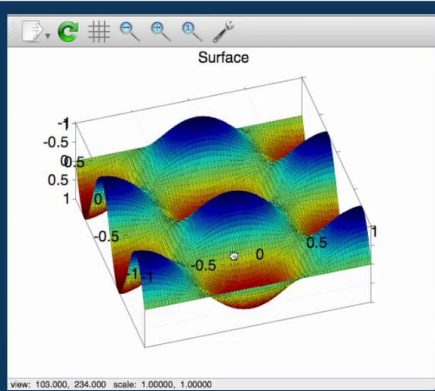


4m 26s

Surface in 3D

```
>> edit surface
surface      surfacePlot.m
surfacePlot
>> edit surfacePlot.m
>> surfacePlot
>> |
```

Command Window



Graphique

```
1 clf % clear current figure
2
3 x = linspace(-1, 1, 101);
4 y = linspace(-1, 1, 201);
5 [X,Y] = meshgrid(x,y);
6
7 Z = sin(2*pi*X) .* cos(pi*Y);
8
9 surf(X,Y,Z)
10 title('Surface')
11
12
```

GUI

MATLAB and Octave for beginners

So now capital X capital Y. So see the difference. It's not anymore lowercase but uppercase. It's equal to a mesh grid so given by X and Y and it will create two matrices of the same size 101 times 201. And once I have these two matrices I can calculate the value of a function on all points given by this matrix points. So Z, capital Z is equal to for now I have to put in the head, the function that gives me the head of my surface. So for example, sine 2π times X. OK. Here you see I use the uppercase and the operation will be element by element. And then times again element by element so I have to put dot times. And then I say cosine of π time Y again capital. So now I am ready to plot. So I have built all the data that I need to define the surface. So I use the surf command. OK. So surf then I have to give as first argument X then Y and then Z. So I have the coordinates in the X and Y-axis direction. And then the value of the head of my surface. And then I can give a title. I run this and I see my surface and my figure. It's a nice smooth surface defined by my function sine of $2\pi X$ times cosine of πY .

Notes

Summary



3.3-3.4 Graphics



What we have seen is only a small introduction to graphics. There are many many different ways to draw functions, surfaces and so on. The more the data is reached, the more careful you should be on the values aspect of your plotting. It is not the goal here. But you have to know that there are some tools and that you have several options.

Notes

Summary



8m 39s