Surface and 3d contour in matplotlib

Asked 7 years, 6 months ago Modified 7 years, 6 months ago Viewed 42k times

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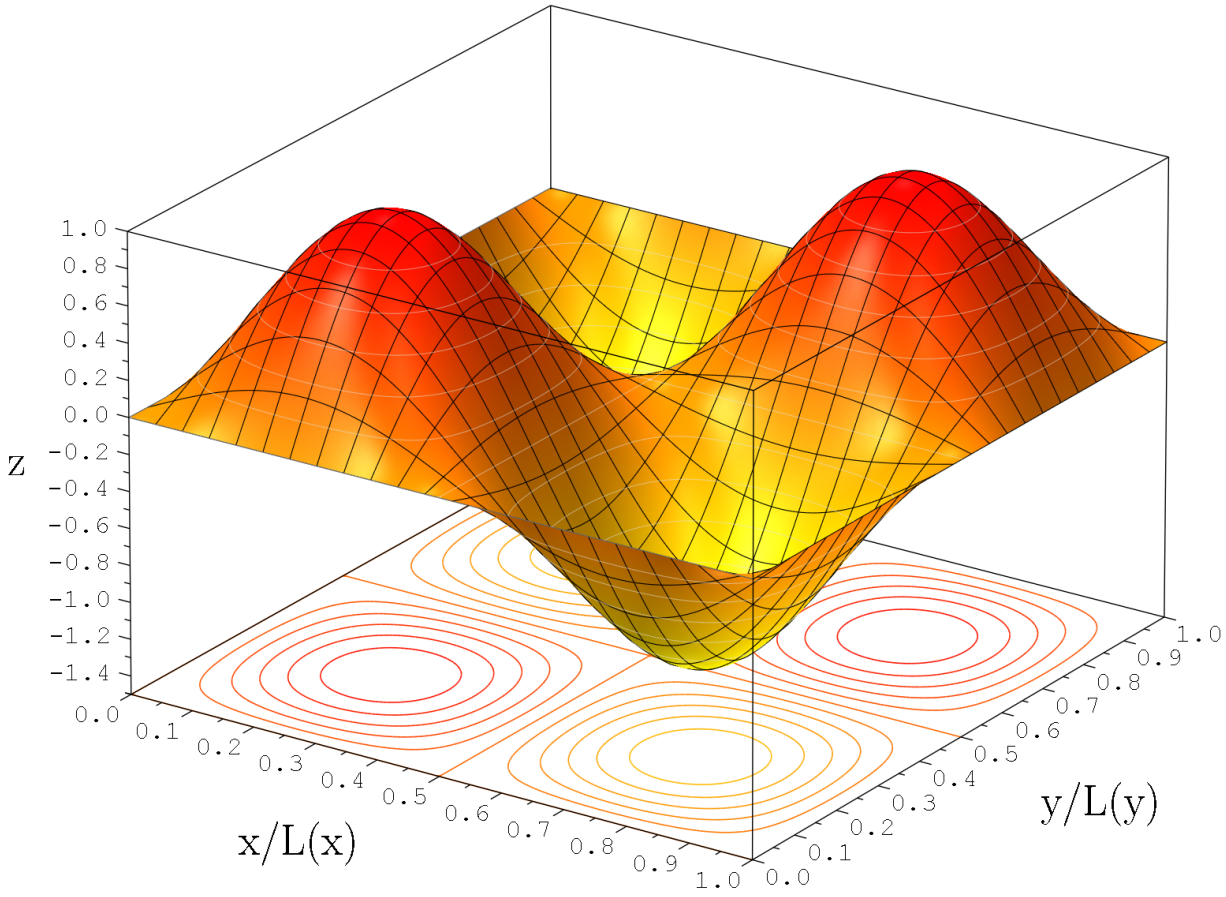
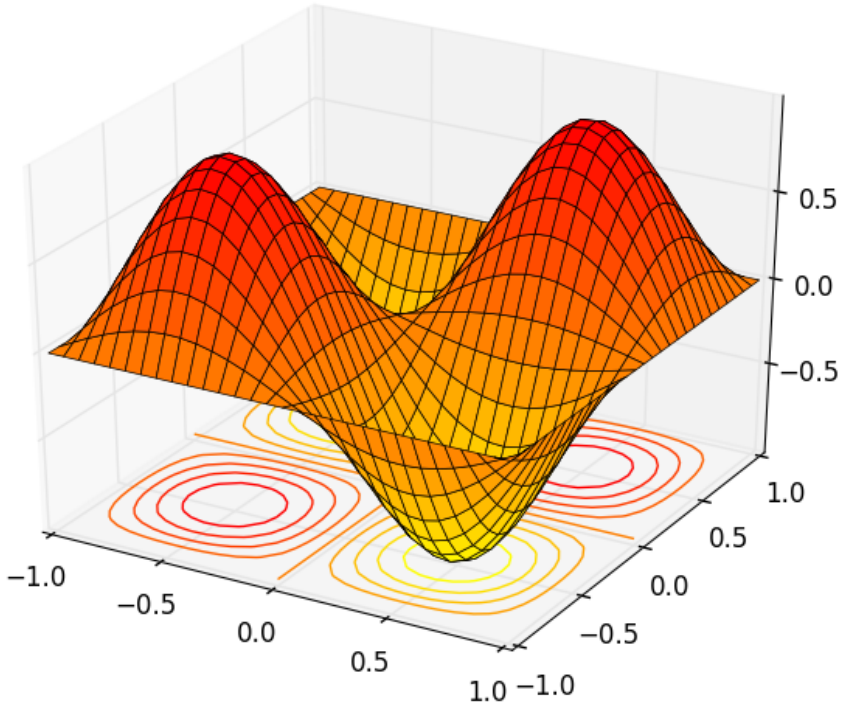
I would like to plot a surface with a colormap, wireframe and contours using `matplotlib`. Something like this:



Notice that I am not asking about the contours that lie in the plane parallel to xy but the ones that are **3D and white** in the image.

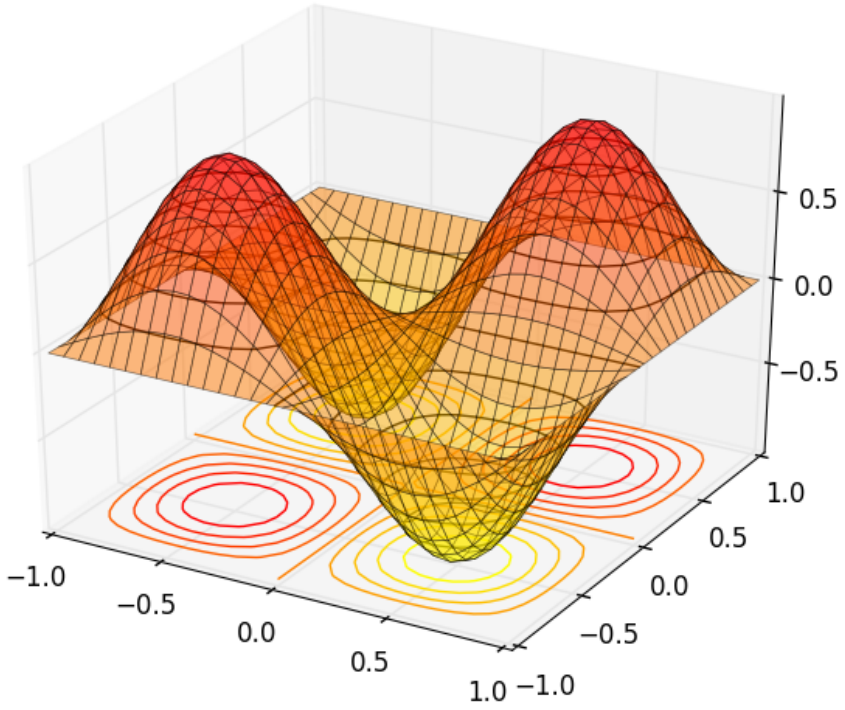
If I go the naïve way and plot all these things I cannot see the contours (see code and image below).

```
import numpy as np
from mpl_toolkits.mplot3d import axes3d
import matplotlib.pyplot as plt

fig = plt.figure()
ax = fig.add_subplot(111, projection="3d")
X, Y = np.mgrid[-1:1:30j, -1:1:30j]
Z = np.sin(np.pi*X)*np.sin(np.pi*Y)
ax.plot_surface(X, Y, Z, cmap="autumn_r", lw=0.5, rstride=1, cstride=1)
ax.contour(X, Y, Z, 10, lw=3, cmap="autumn_r", linestyles="solid", offset=-1)
ax.contour(X, Y, Z, 10, lw=3, colors="k", linestyles="solid")
plt.show()
```



If a add transparency to the surface facets then I can see the contours, but it looks really cluttered (see code and image below)

```
import numpy as np
from mpl_toolkits.mplot3d import axes3d
import matplotlib.pyplot as plt

fig = plt.figure()
ax = fig.add_subplot(111, projection="3d")
X, Y = np.mgrid[-1:1:30j, -1:1:30j]
Z = np.sin(np.pi*X)*np.sin(np.pi*Y)
ax.plot_surface(X, Y, Z, cmap="autumn_r", lw=0.5, rstride=1, cstride=1, alpha=0.5)
ax.contour(X, Y, Z, 10, lw=3, cmap="autumn_r", linestyles="solid", offset=-1)
ax.contour(X, Y, Z, 10, lw=3, colors="k", linestyles="solid")
plt.show()
```



Question: Is there a way to obtain this result in `matplotlib` ? The shading is not necessary, though.

python matplotlib surface mplot3d Edit tags

Share Edit Follow Close Flag edited Feb 17, 2016 at 4:21

asked Feb 17, 2016 at 0:03

nicoguaro
3,629 1 32 57

1 If you set the alpha of your contours to a small value it might look less cluttered. – drenerbas Jun 1, 2018 at 20:51

2 Answers

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Apparently it is a bug, if you try this

```
import numpy as np
from mpl_toolkits.mplot3d import axes3d
import matplotlib.pyplot as plt

fig = plt.figure()
ax = fig.add_subplot(111, projection="3d")
```

```
X, Y = np.mgrid[-1:1:30j, -1:1:30j]
Z = np.sin(np.pi*X)*np.sin(np.pi*Y)


ax.plot_surface(X, Y, Z, cmap="autumn_r", lw=0, rstride=1, cstride=1)
ax.contour(X, Y, Z+1, 10, lw=3, colors="k", linestyles="solid")
plt.show()
```

And rotate around, you will see the contour lines disappearing when they shouldn't

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answered Feb 17, 2016 at 9:28

Noel Segura Meraz
2,265 1 12 17

I'm sorry; I don't understand the conclusion of your answer. Is this a workaround for the bug (i.e. a certain rotation angle allows the contours to show)? Or is it hopeless to try to display both plot_surface and contours? – John HaTrick Feb 3, 2022 at 0:54

1

I think you want to set the offset to the contour :

```
ax.contour(X, Y, Z, 10, offset=-1, lw=3, colors="k", linestyles="solid", alpha=0.5)
```

See this example for more:

http://matplotlib.org/examples/mplot3d/contour3d_demo3.html

And the docs here:

http://matplotlib.org/mpl_toolkits/mplot3d/tutorial.html#contour-plots

> offset: If specified plot a projection of the contour lines on this position in plane normal to zdir

Note, `zdir = 'z'` by default, but you can project in the x or y direction be setting the `zdir` accordingly.

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answered Feb 17, 2016 at 2:19

tmdavison
64.3k 12 187 165

Not really, this will plot the contour in 2D. But not in 3D as I want them. See the example image, it has white contours. – nicoguaro Feb 17, 2016 at 2:22

1 Ah ok, sorry I misunderstood the question – tmdavison Feb 17, 2016 at 6:27