

Aerospace Computing

Assignment #1

Due: 1/19/24

This assignment is designed to get you to exercise your Python coding and plotting skills. Assignments should be prepared according to the Assignment Preparation Rules listed in the Syllabus and using Jupyter notebook only.

Tasks

You are to create a Python code that will plot contours and line plots of the following function.

$$f(x) = A \cos(n\pi x + \Phi) + B \cos(m\pi y + \varphi)$$

Your code should:

- Have a header that describes the code and liberally documents every aspect.
- Interact with the user by printing to the screen a description of what the code can do.
- Request input of A, B, n, m, Φ and Ψ to define the function, it should then report out what was entered and ask for confirmation or reentry.
- Continually ask whether you want a contour plot or a line plot or want to end.
 - When a contour plot is demanded by the user, your code should request the x and y range of the desired contour plot, and the plot should be generated to both the screen and a file.
 - When a line plot is demanded, your code should ask whether a vertical or horizontal plot is required and once told, should ask for the value of the fixed variable and the range of the other. It should generate the plot to both the screen and a file.
- When the code is told to stop, it should let the user know what files the resulting plots can be found in.
- The code should employ at a minimum:
 - Numpy arrays
 - One or more functions
 - A while or for loop
 - And be well documented
- Following the Assignment Preparation Rules, upload the code and output files for the specific case of $A=2, B=1, m=3/2, n=5, \Phi=\pi/4$ and $\Psi=-\pi/3$. Plot contours over a range of -10π to $+10\pi$ in both x and y , and produce line plots at $x=5\pi$ and $y=5\pi$ across the full range of the other variable (e.g., for the $x=5\pi$ plot use y values from -10π to $+10\pi$).