In the last post I showed you guys how to calculate Fourier Coefficients for a given function defined in the range, [-l,l].

We can also use the Fourier Coefficients to calculate the Fourier Series and then Plot the FS Approximation and compare it to the original function.

I have used the same code as before and just added a few more lines of code.

If you haven't read the last post which is being continued here then I recommend you read that first here.

Code:

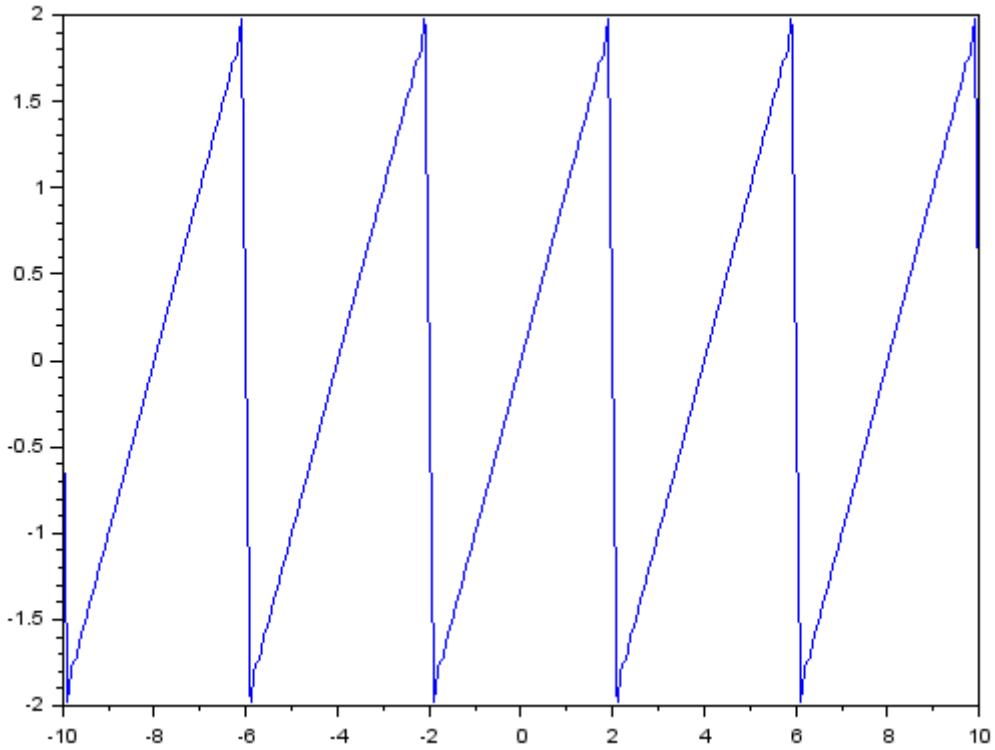
```
funcprot(0);
function [a0,A,B]=fourierplot(l,n,f)
    clf();
    a0=1/l*intg(-l,l,f,.000000001);
    for i=1:n
        function b=f1(x,f)
            b=f(x)*cos(i*%pi*x/l);
        endfunction
        function c=f2(x,f)
            c=f(x)*sin(i*%pi*x/l);
        endfunction
        A(i)=1/l*intg(-l,l,f1,.000000001);
        B(i)=1/l*intg(-l,l,f2,.000000001);
    end
    function series=solution(x)
        series=a0/2;
        for i=1:n
            series=series+A(i)*cos(i*%pi*x/l)+B(i)*sin(i*%pi*x/l);
        end
    endfunction
    x=-5*l:0.1:5*l;
    plot(x,solution(x));
endfunction
```

As you can notice, the code is almost the same as before, except that I have changed the name of the function from *'fourier'* to *'fourierplot'*. And in the previous post I had only calculated the Fourier Coefficients, a0, A, B, but this time I am using those to calculate the Fourier Series, through the function *'solution'*. And finally I have plotted the Fourier Series.

Sample Demo:

```
deff('a=f(x)','a=x');
[A0,A,B]=fourierplot(2,100,f)
```

Output:



In the above sample code I have defined a function f(x)=x, and then I have called the function fourierplot with arguments l=2, n=100 & the function f. l is the half of the period so the function is periodic with a period of 2l=4 from [-2,2], which is evident from the graph. If the value of n is not large enough then you might not get a very good approximation.

I have created a module in scilab which contains both the above macro, and once installed can be used as an in-built function. You can download it from here: https://atoms.scilab.org/toolboxes/fstools

Tutorial:

Leave your questions/suggestion/corrections in the comments section down below and I'll get back to you soon.

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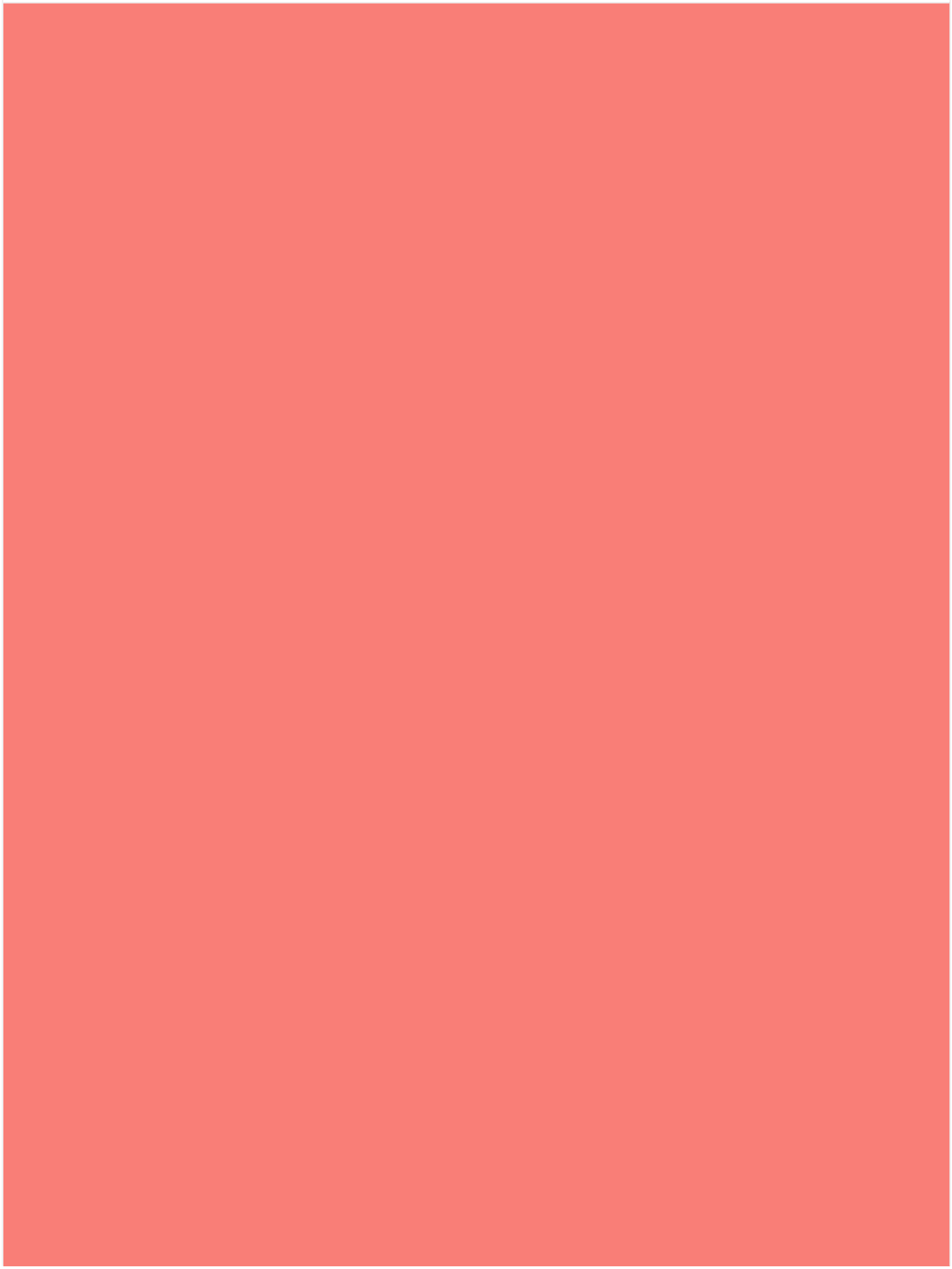
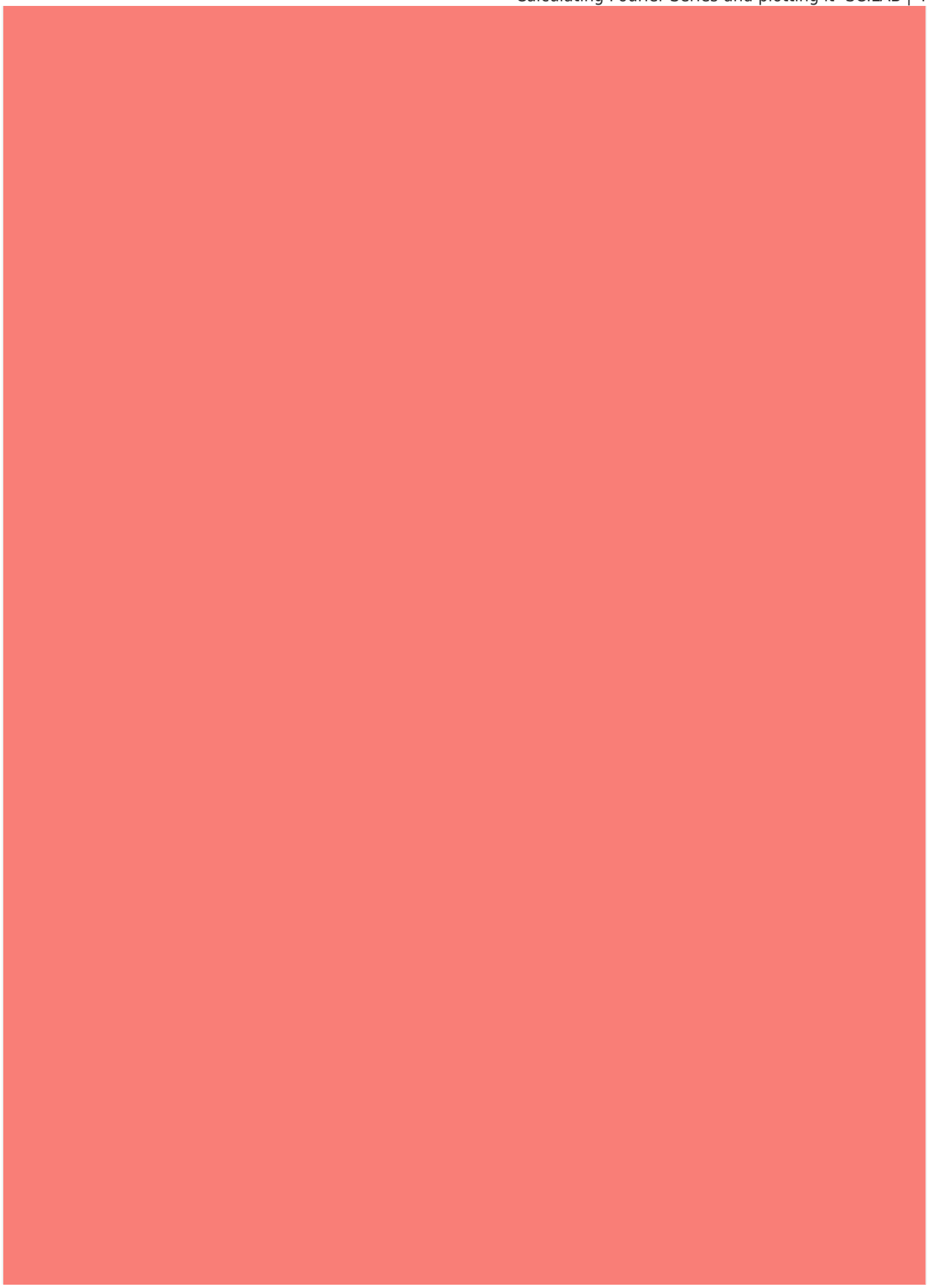
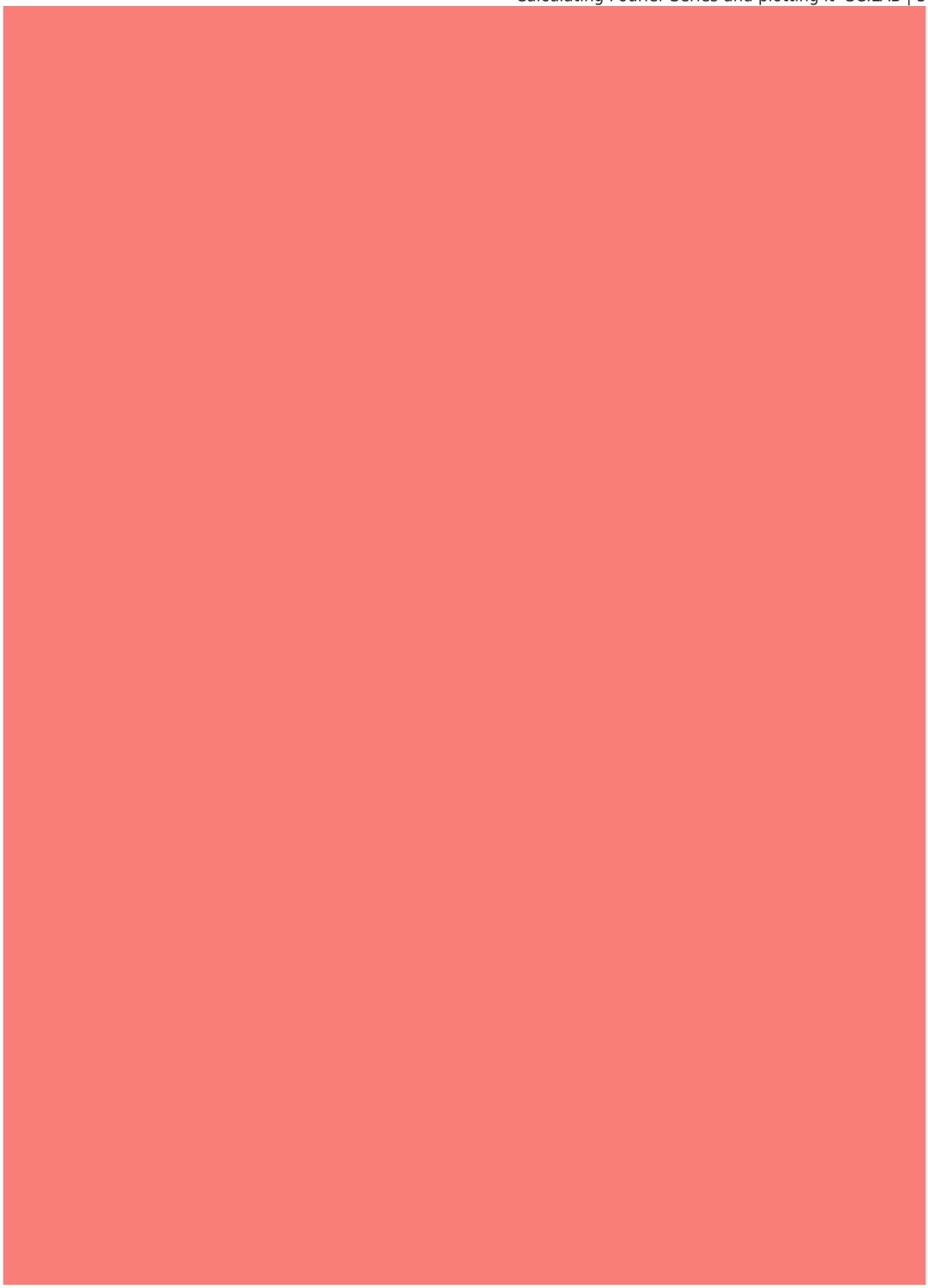
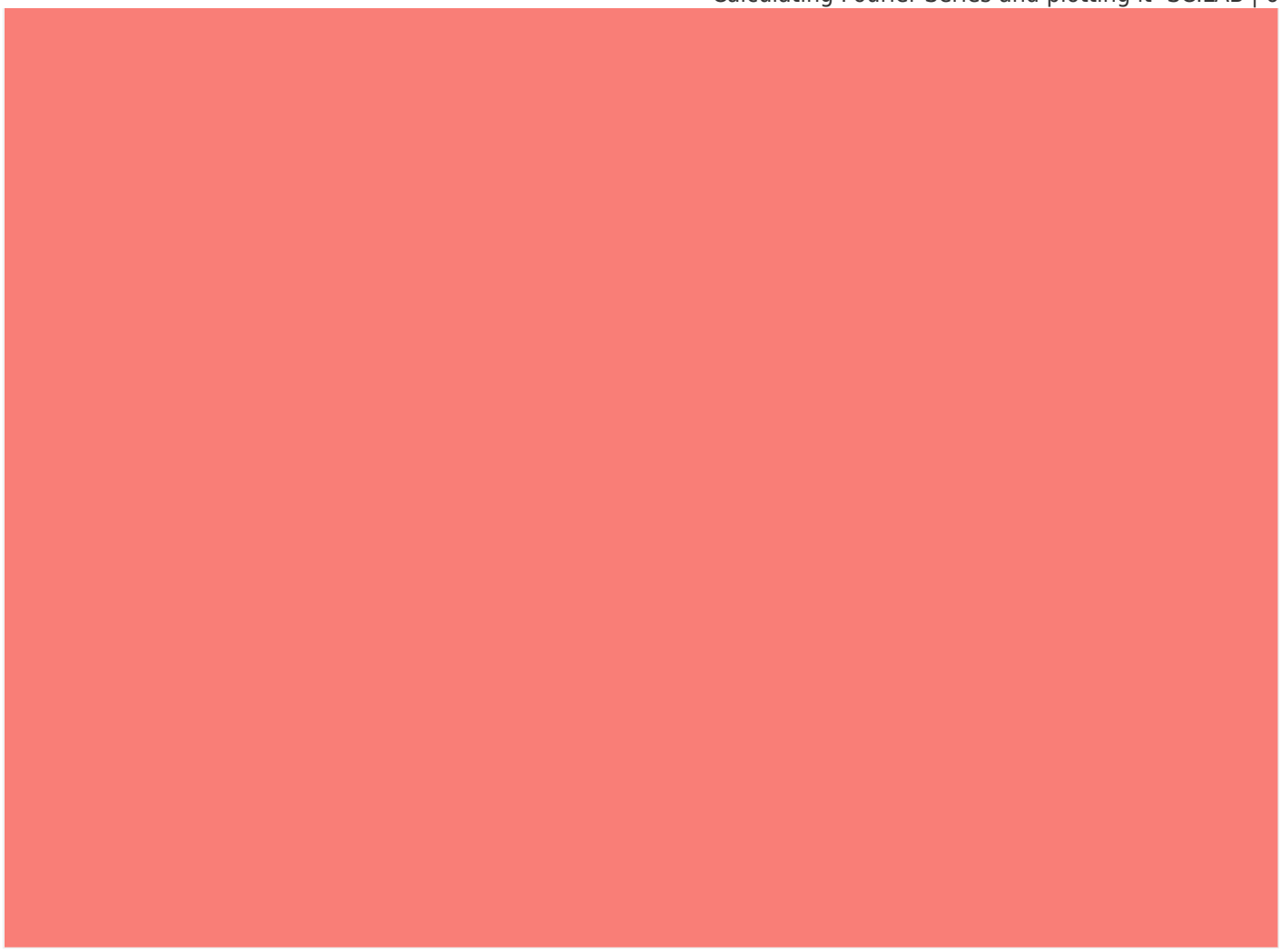
I'm a physicist specializing in computational material science with a PhD in Physics from Friedrich-Schiller University Jena, Germany. I write efficient codes for simulating light-matter interactions at atomic scales. I like to develop Physics, DFT, and Machine Learning related apps and software from time to time. Can code in most of the popular languages. I like to share my knowledge in Physics and applications using this Blog and a YouTube channel.









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