Dept of Electronics and Communication Engineering, TKMCE Kollam

Scientific Computing Lab Aug-Dec 2020

Lab 7: Convergence of Fourier series

Experiment:

1. Realize the Fourier series $f(t) = \frac{4}{\pi}\left[1 - \frac{1}{3}cos\frac{2\pi 3t}{T} + \frac{1}{5}cos\frac{2\pi 5t}{T} - \frac{1}{7}cos\frac{2\pi 7t}{T} + \ldots.\right]$
   Realize the vector t = [0, 100] with an increment of 0.01 and keep T = 20.

2. Plot the first 3 or 4 terms on the same graphic window and understand how the smooth sinusoids add up to a discontinuous square function.

3. Compute and plot the series for the first 10, 20, 50 and 100 terms.

4. With t made a zero vector, f (0) = 1, resulting in the Madhava series for π as $\pi = 4\left[1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots.\right]$. Use this to compute π for the first 10, 20, 50 and 100 terms.

Reports:

Preliminary Lab report:

1. Write a short note on Fourier series and its significance

2. Write a short note on Madhava series for π.

3. Write the algorithm/ flowchart for the experiments listed in preceding section

Final Lab Report:

In addition to the Pre-lab report, document the code, comment each line and clearly report the results of each program (wherever applicable).