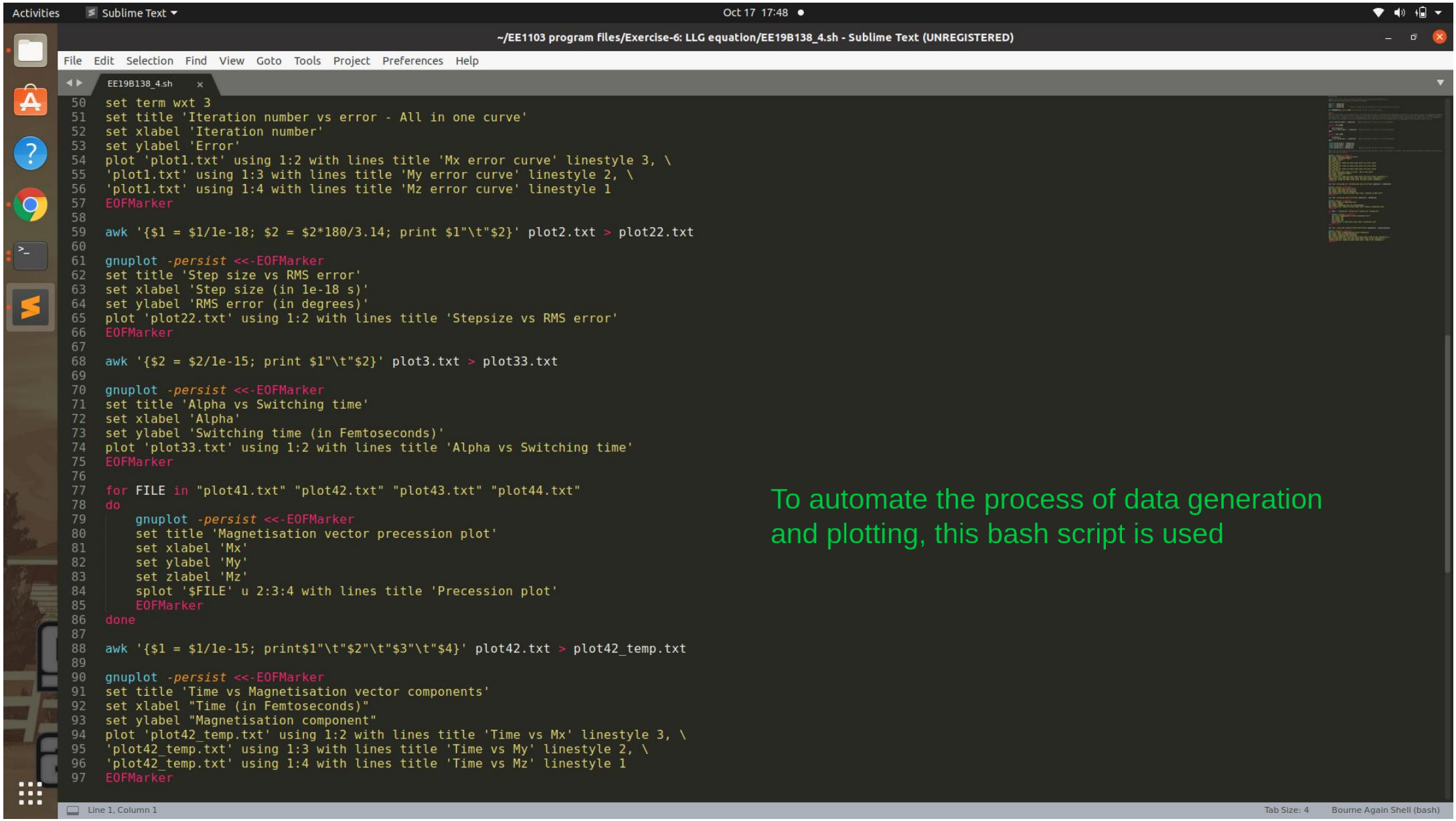
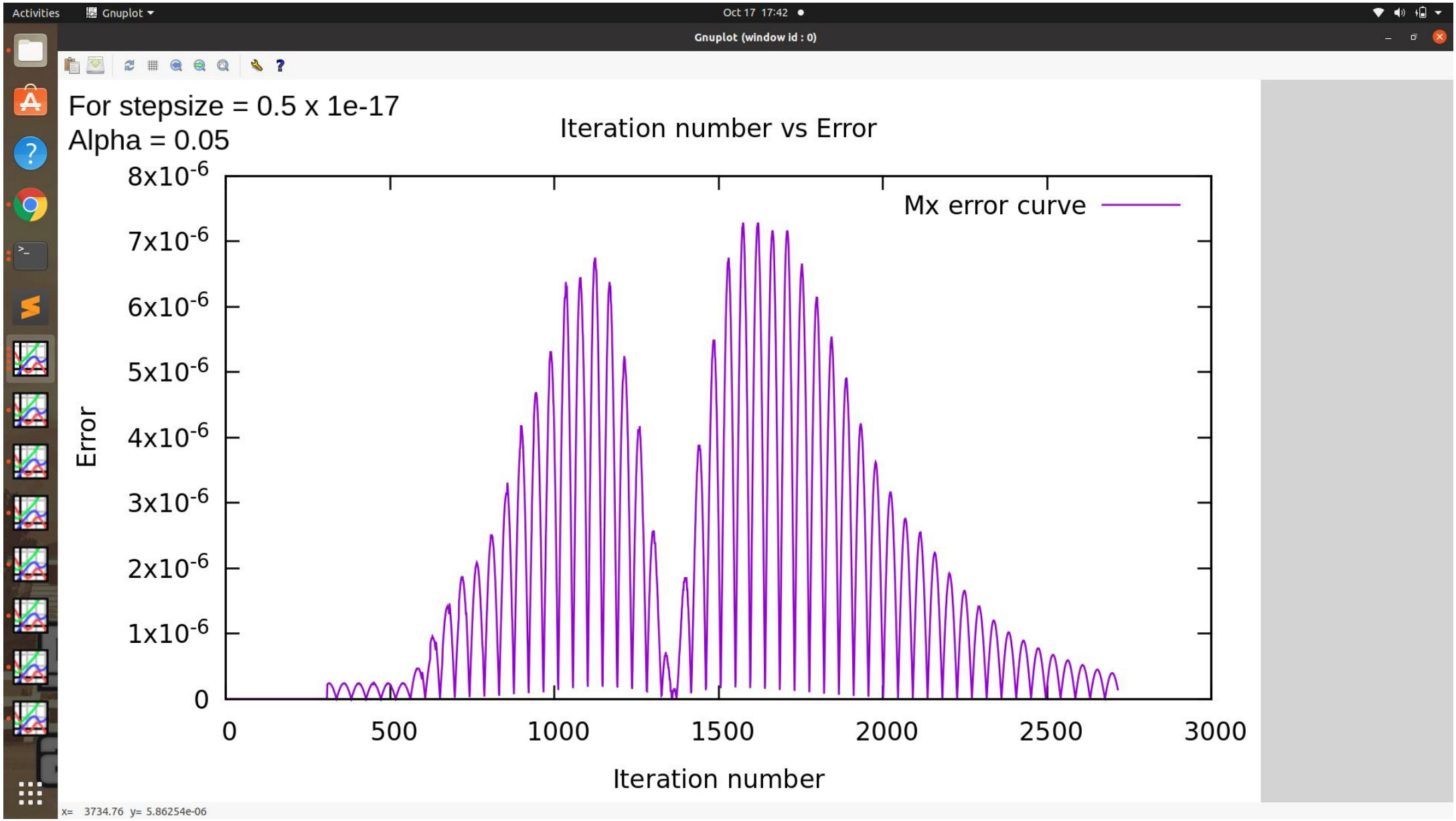
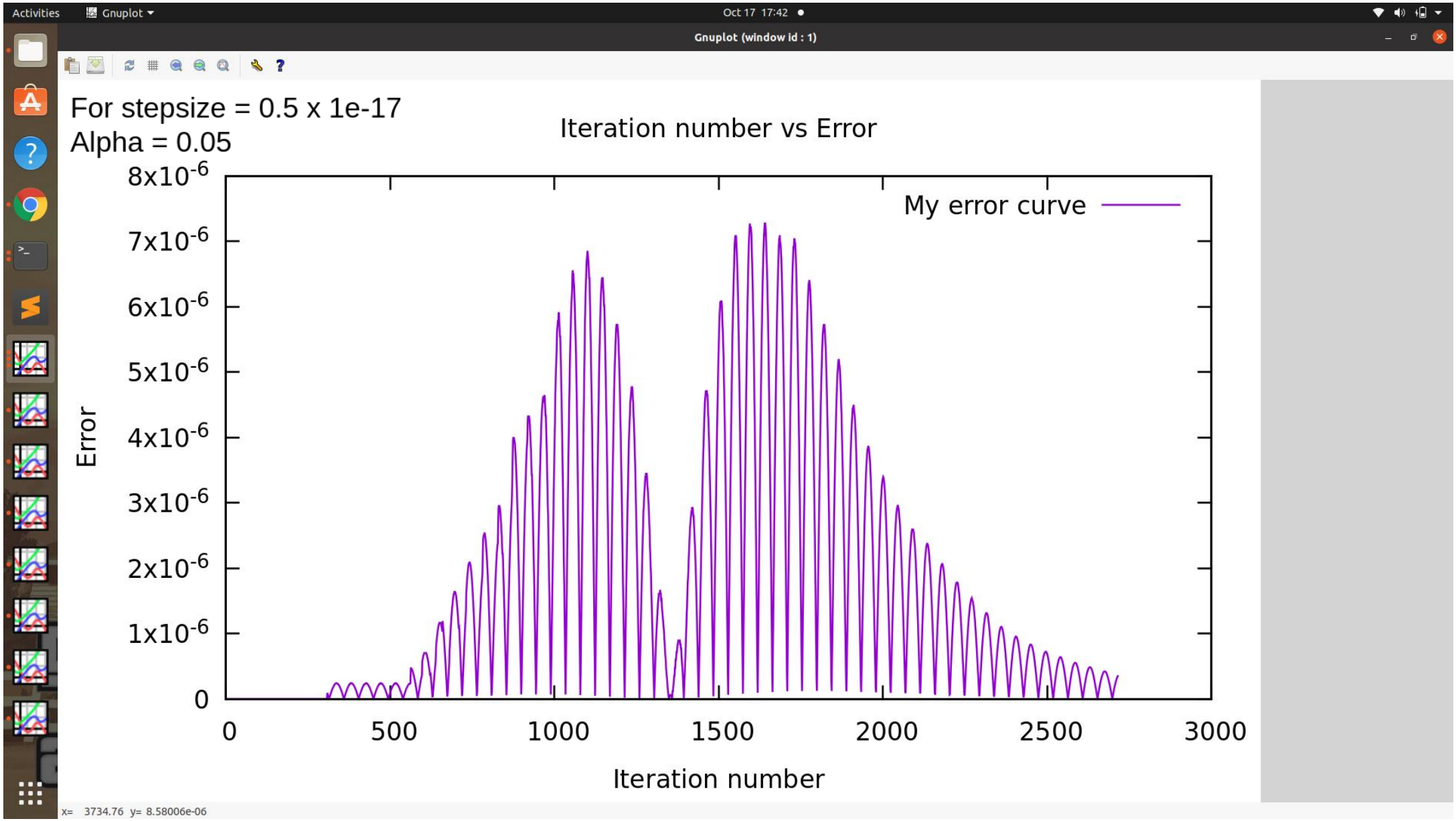
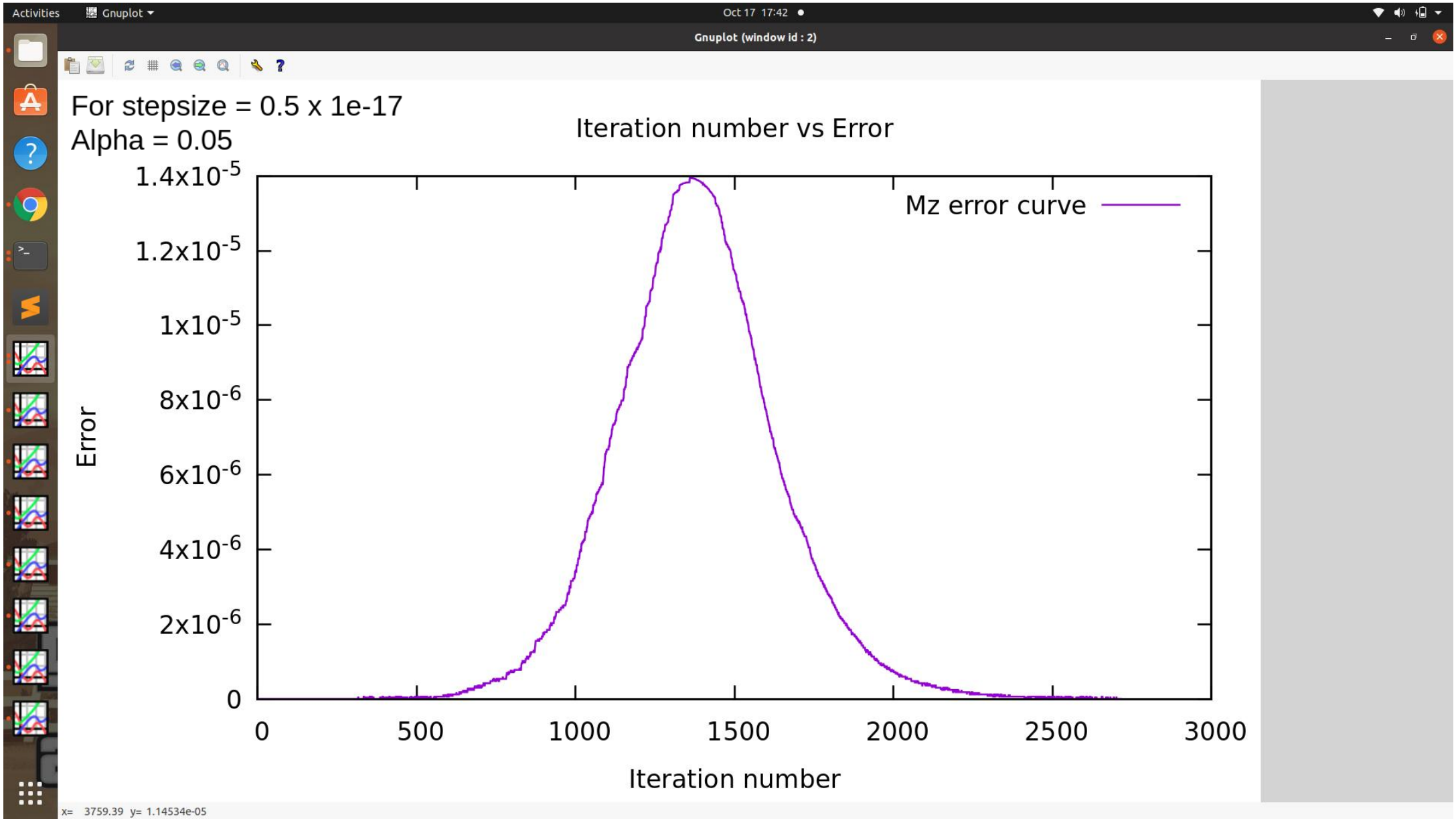
Activities
Sublime Text
Oct 17 17:47
~/EE1103 program files/Exercise-6: LLG equation/EE19B138_4.sh - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help
EE19B138_4.sh
#!/bin/bash
#Usage: Open your linux terminal and enter the command: bash EE19B138_4.sh
#Note: All the files will be created in the PWD.
echo "" > plot2.txt
echo "" > plot3.txt
echo "" > plot4.txt #Files created and initialised to store the data to be plotted
gcc EE19B138_4.c -lm -o plot #Executable of the .c file is created
#Note:
#In all the places, the stepsize is in the order of 1e-17 or 1e-18 because the derivative of Phi is in the order of 1e16. So choosing a stepsize
in the order of 1e-12 or 1e-13 leads to an increase of 1000 in Phi for every iteration which contradicts the meaning of the SMALL increment.
#Theoretically, stepsize must be infinitesimally small and all calculations are done with that limit operating. But since, it is not possible in a computer,
I chose it as 1e-18 so the Phi increment would be in the order of 0.01 radians which is comparable to the range in which Phi is.
./plot 0.5e-17 0.05 1 > plot1.txt #Data generated for part 1 of the assignment
for i in {1..1000}
do
var="${i}e-18"
./plot $var 0.05 2 >> plot2.txt #Data generated for part 2 of the assignment
done
for i in {10..300}
do
b="${i}e-3"
./plot 1e-18 $b 3 >> plot3.txt #Data generated for part 3 of the assignmment
done
./plot 1e-18 0.01 4 > plot41.txt
./plot 1e-18 0.05 4 > plot42.txt
./plot 1e-18 0.1 4 > plot43.txt
./plot 1e-18 0.3 4 > plot44.txt #Data generated for part 4 of the assignment
#The rest of the code below plots all the above generated data using the "gnuplot" software. This bash script basically automates the data generation
#and plotting processes.
gnuplot -persist <<-EOFMarker
set title 'Iteration number vs Error'
set xlabel 'Iteration number'
set ylabel 'Error'
set term wxt 0
plot 'plot1.txt' using 1:2 with lines title 'Mx error curve'
set term wxt 1
plot 'plot1.txt' using 1:3 with lines title 'My error curve'
set term wxt 2
plot 'plot1.txt' using 1:4 with lines title 'Mz error curve'
Bash
script
Line 1, Column 1
Tab Size: 4
Bourne Again Shell (bash)

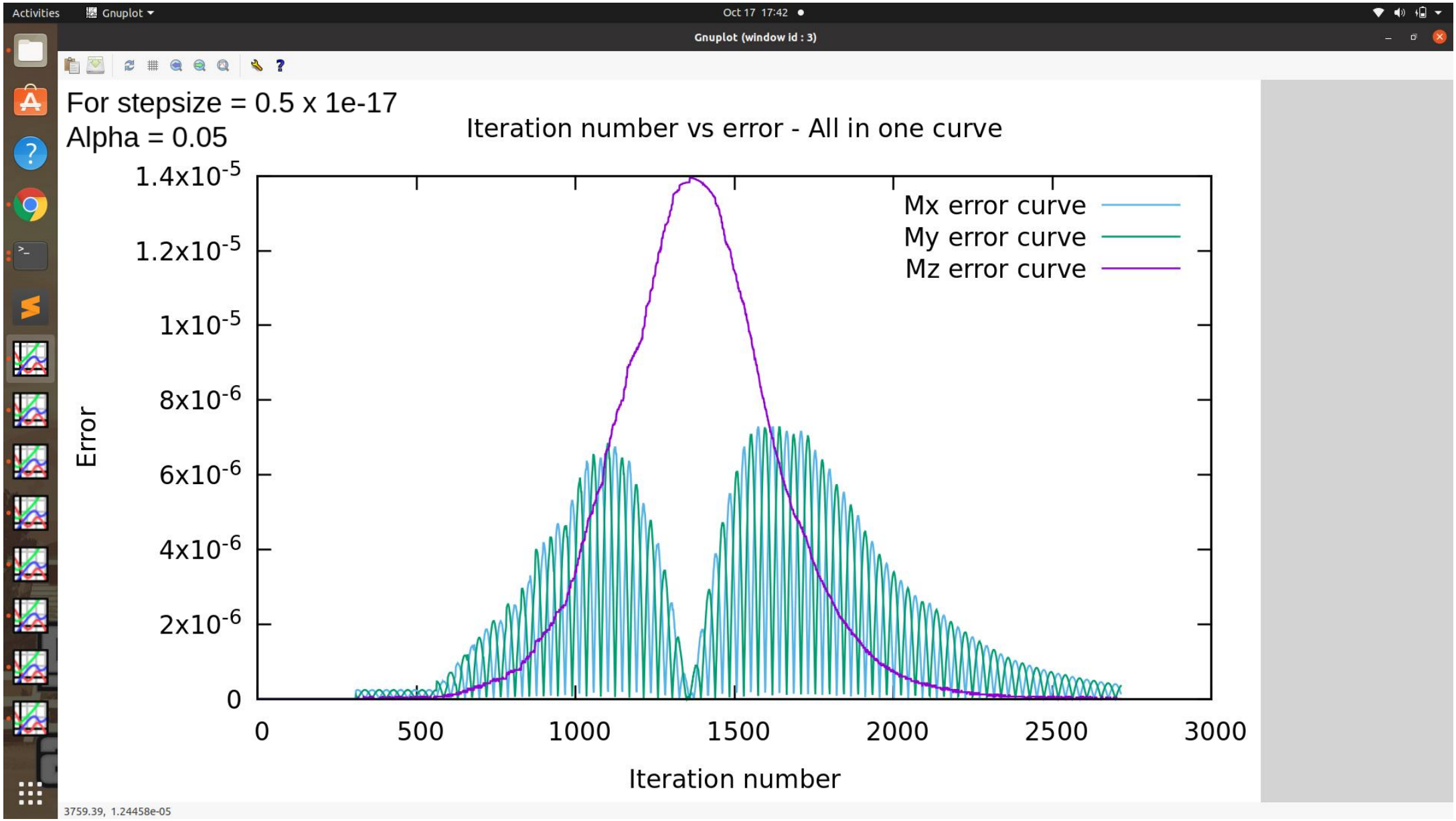


To automate the process of data generation and plotting, this bash script is used

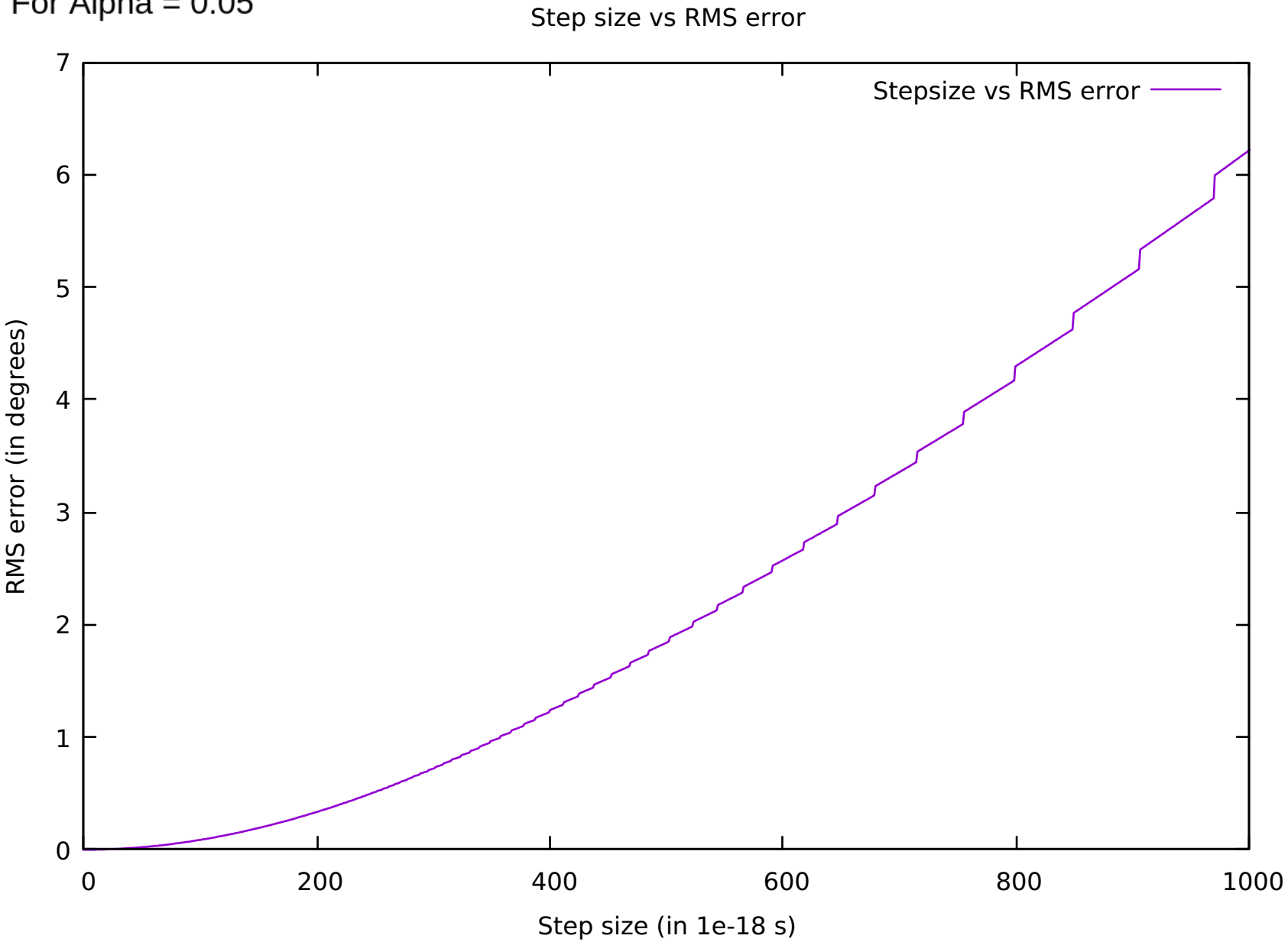

Activities
Gnuplot
Oct 17 17:42
Gnuplot (window id : 0)
For stepsize = 0.5 x 1e-17
Alpha = 0.05
Iteration number vs Error
Mx error curve
Error
8x10-6
7x10-6
6x10-6
5x10-6
4x10-6
3x10-6
2x10-6
1x10-6
0
0
500
1000
1500
2000
2500
3000
Iteration number
x= 3734.76 y= 5.86254e-06

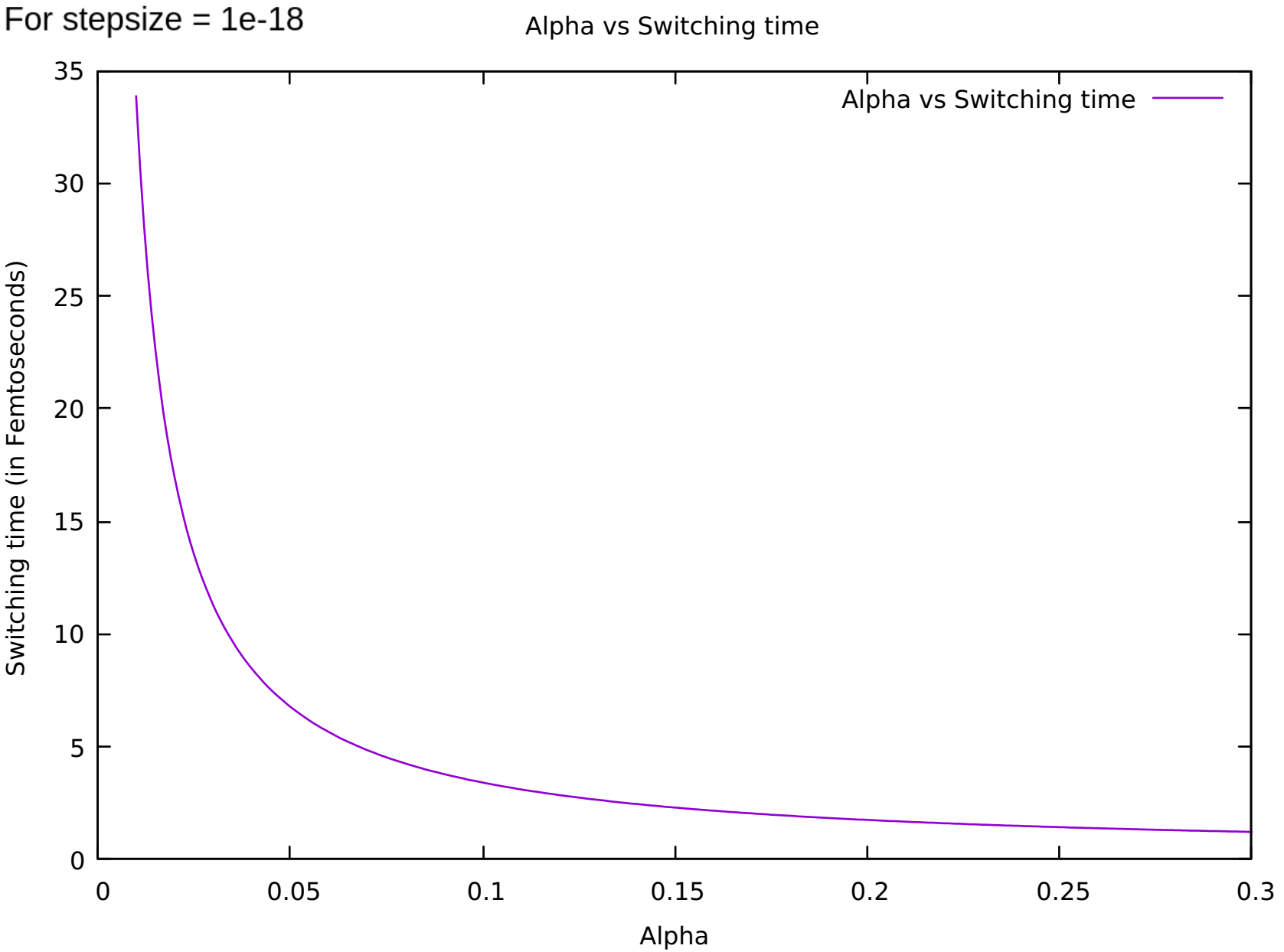

Activities
Gnuplot
Oct 17 17:42
Gnuplot (window id : 1)
For stepsize = 0.5 x 1e-17
Alpha = 0.05
Iteration number vs Error
My error curve
Error
8x10-6
7x10-6
6x10-6
5x10-6
4x10-6
3x10-6
2x10-6
1x10-6
0
0
500
1000
1500
2000
2500
3000
Iteration number
x= 3734.76 y= 8.58006e-06


Activities
Gnuplot
Oct 17 17:42
Gnuplot (window id : 2)
For stepsize = 0.5 x 1e-17
Alpha = 0.05
Iteration number vs Error
Mz error curve
Error
1.4x10-5
1.2x10-5
1x10-5
8x10-6
6x10-6
4x10-6
2x10-6
0
0
500
1000
1500
2000
2500
3000
Iteration number
x= 3759.39 y= 1.14534e-05

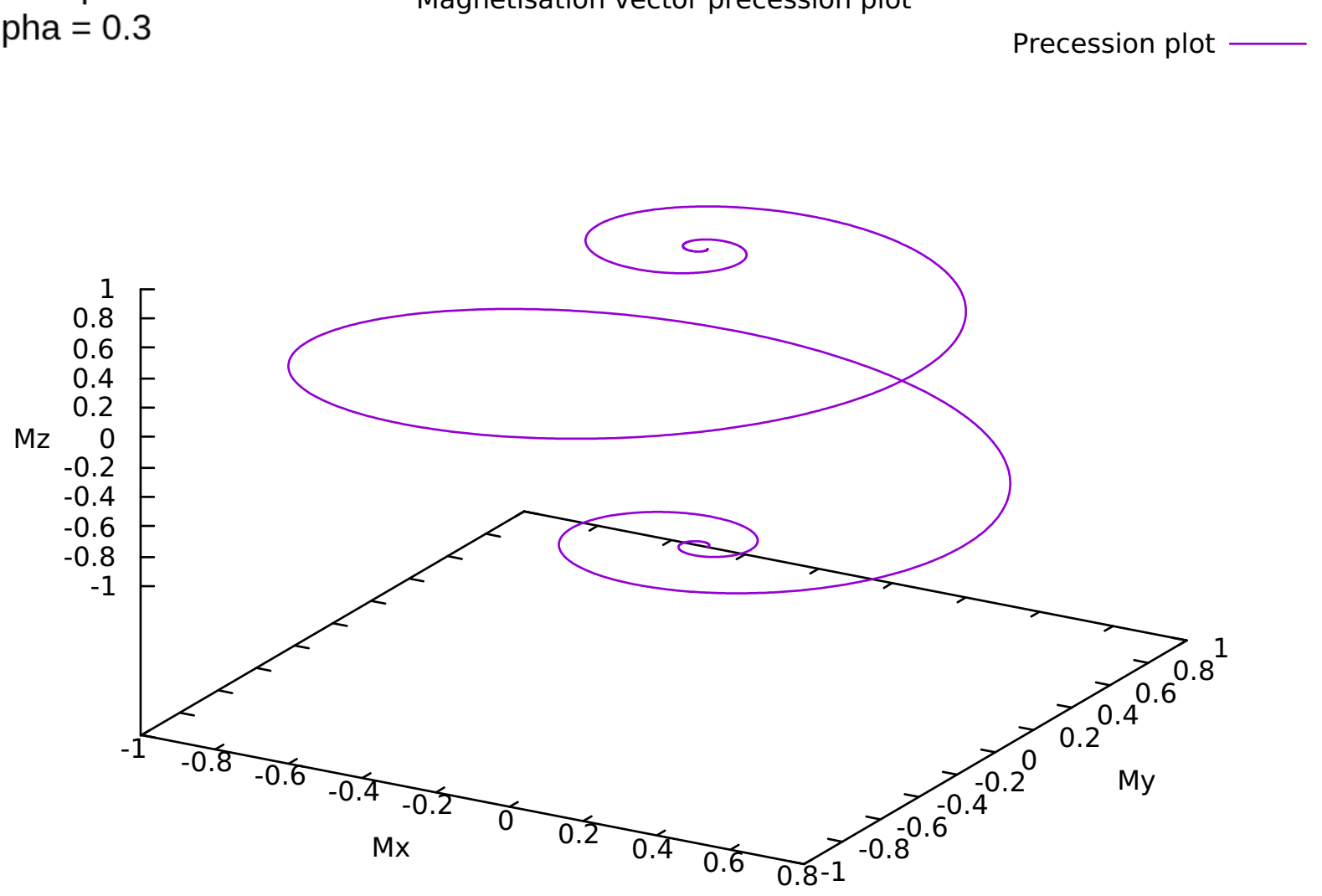

Activities
Gnuplot
Oct 17 17:42
Gnuplot (window id : 3)
For stepsize = 0.5 x 1e-17
Alpha = 0.05
Iteration number vs error - All in one curve
Mx error curve
My error curve
Mz error curve
Error
1.4x10-5
1.2x10-5
1x10-5
8x10-6
6x10-6
4x10-6
2x10-6
0
0
500
1000
1500
2000
2500
3000
Iteration number
3759.39, 1.24458e-05

For Alpha = 0.05

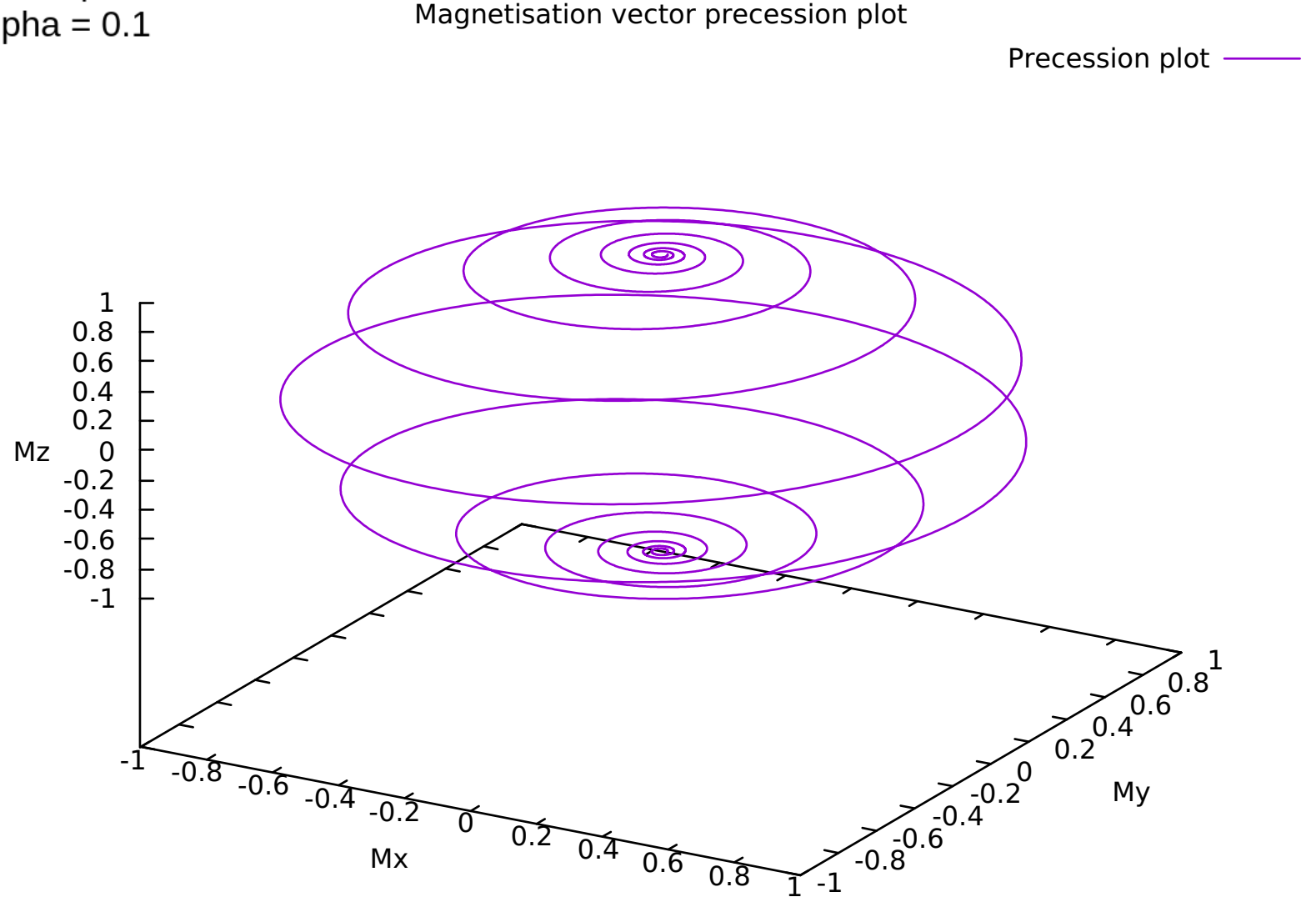



For stepsize = 1e-18
Alpha vs Switching time
Alpha vs Switching time
Switching time (in Femtoseconds)
Alpha
35
30
25
20
15
10
5
0
0
0.05
0.1
0.15
0.2
0.25
0.3

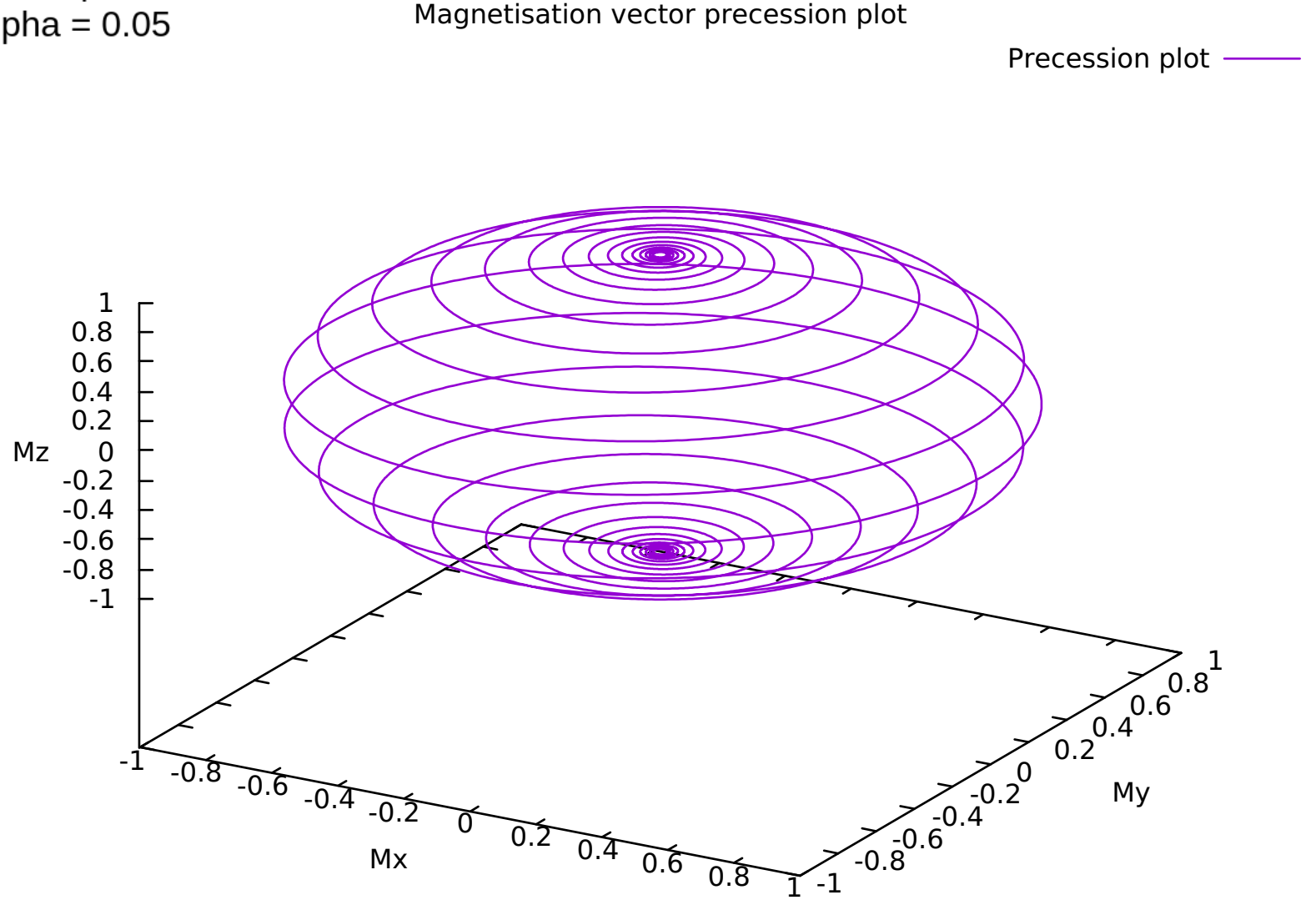
For stepsize = 1e-18
Alpha = 0.3



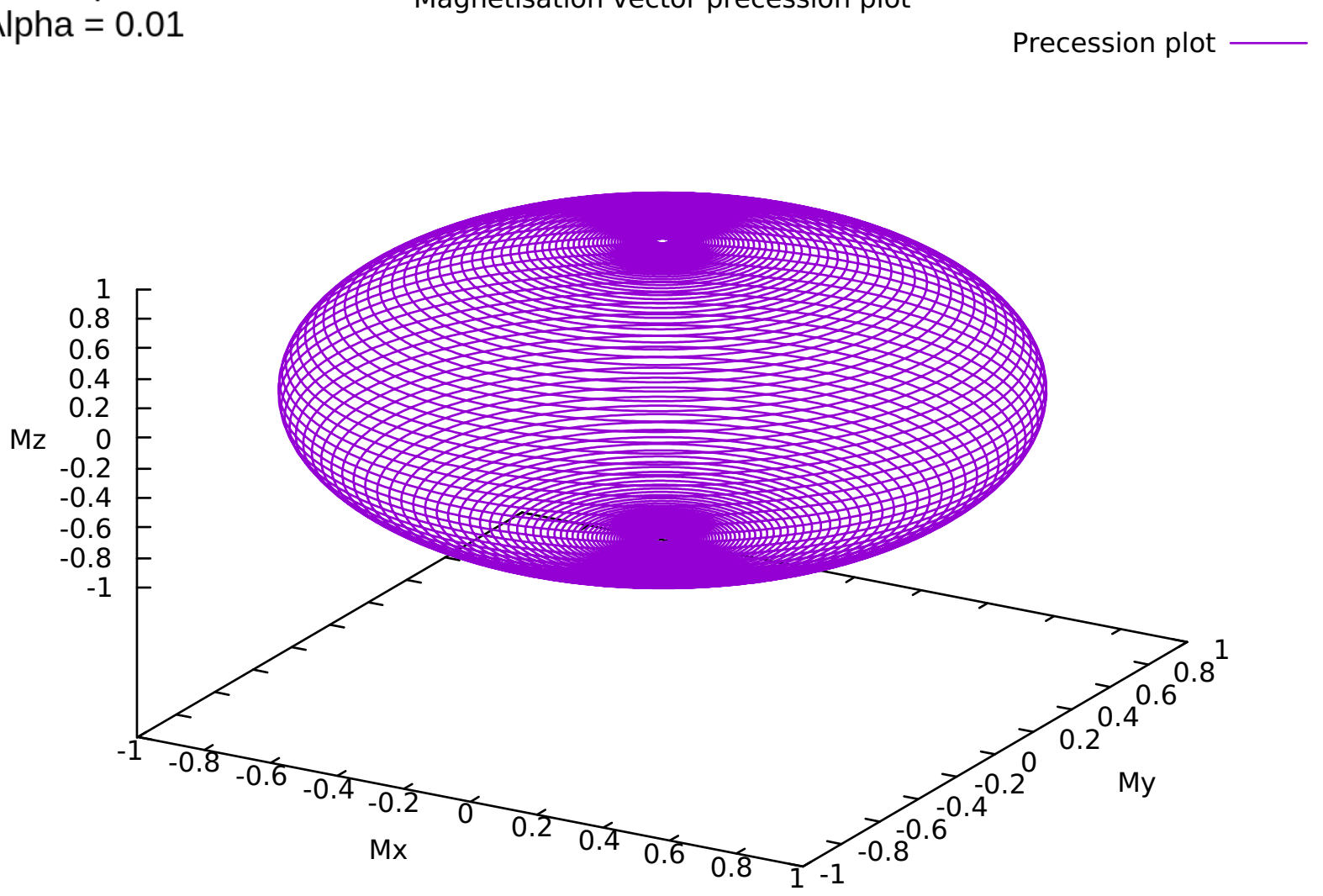
For stepsize = 1e-18
Alpha = 0.1

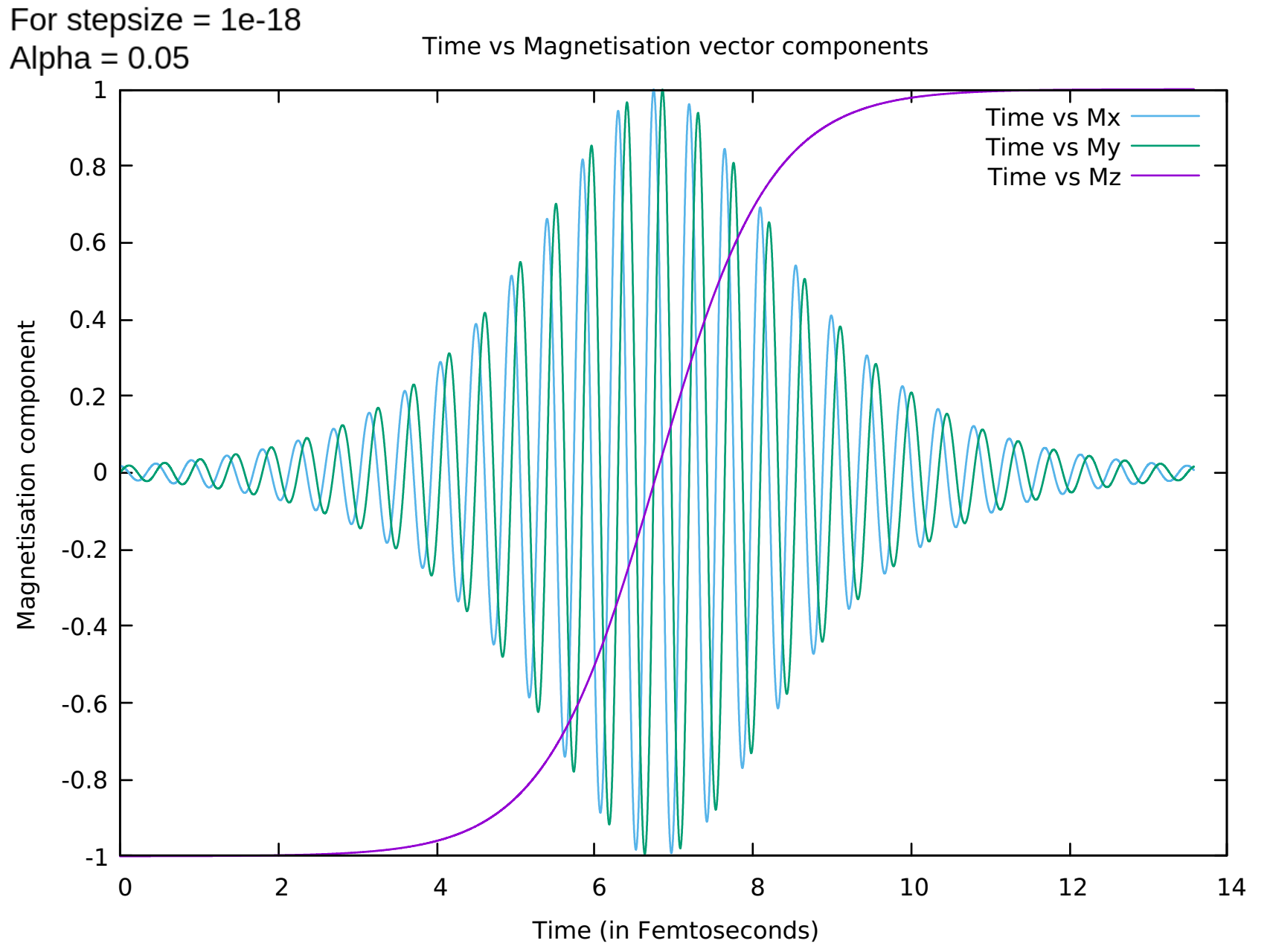


For stepsize = 1e-18
Alpha = 0.05



For stepsize = 1e-18
Alpha = 0.01




For stepsize = 1e-18
Alpha = 0.05
Time vs Magnetisation vector components
Time vs Mx
Time vs My
Time vs Mz
Magnetisation component
Time (in Femtoseconds)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
2
4
6
8
10
12
14