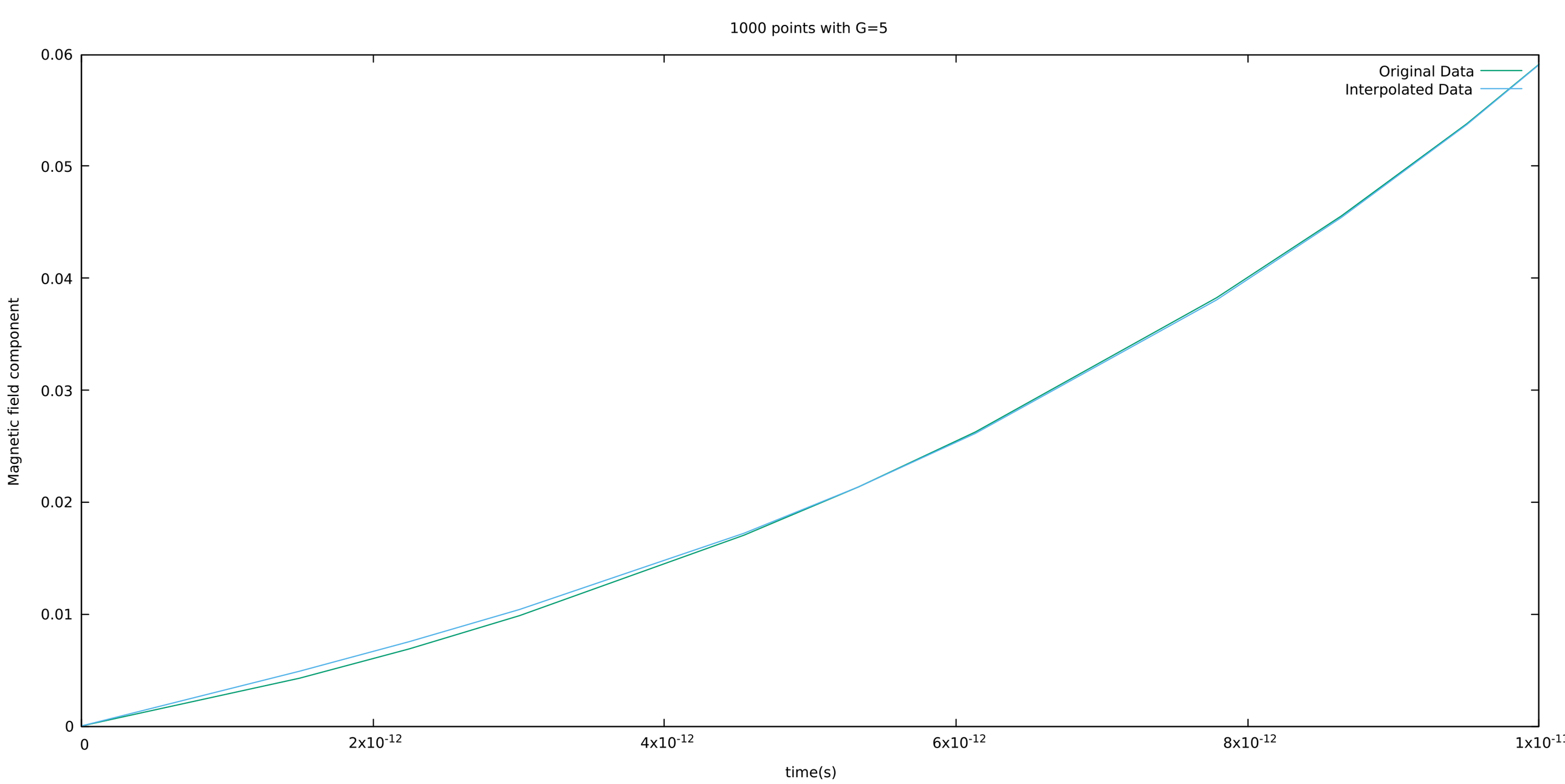
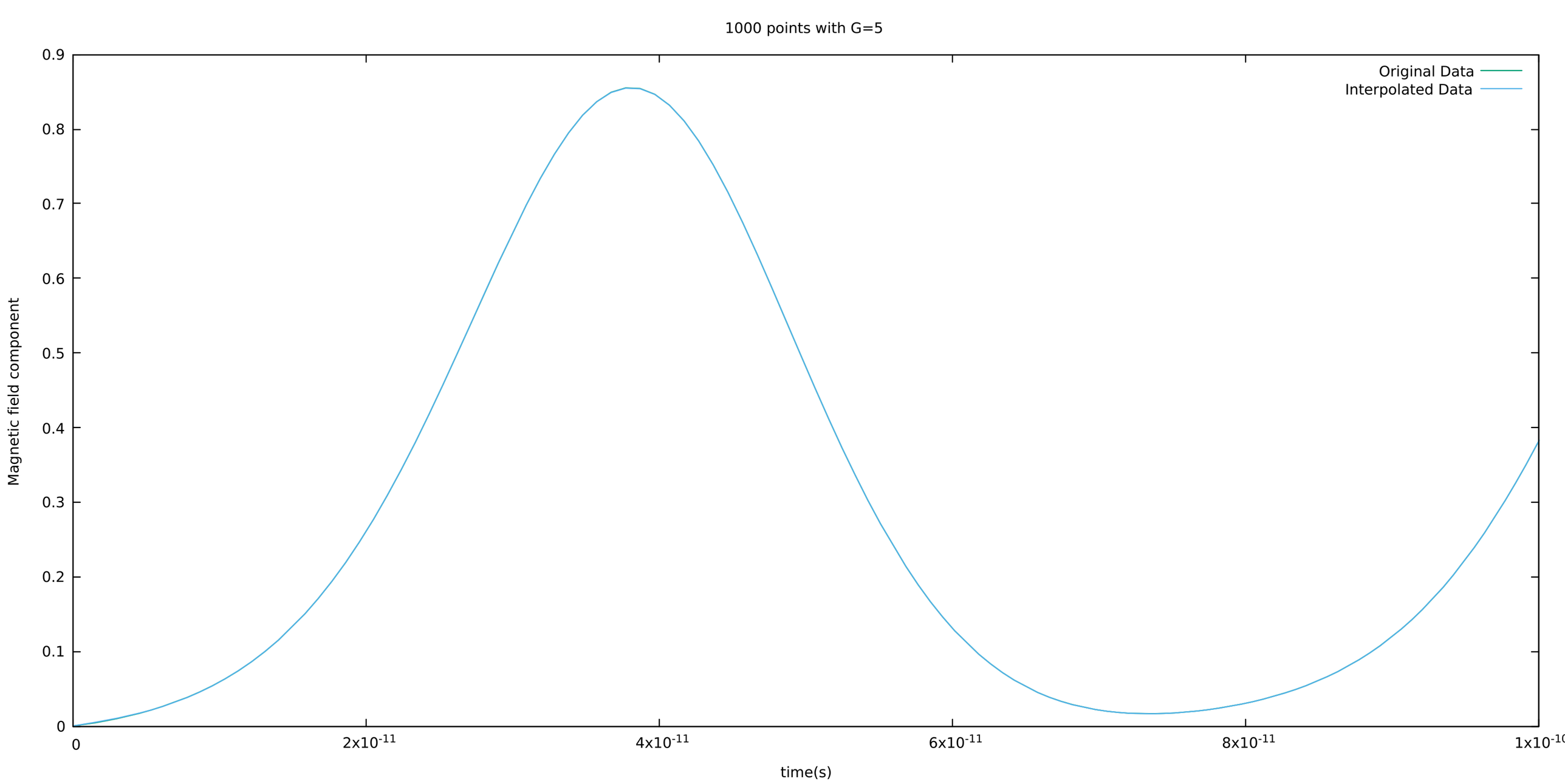
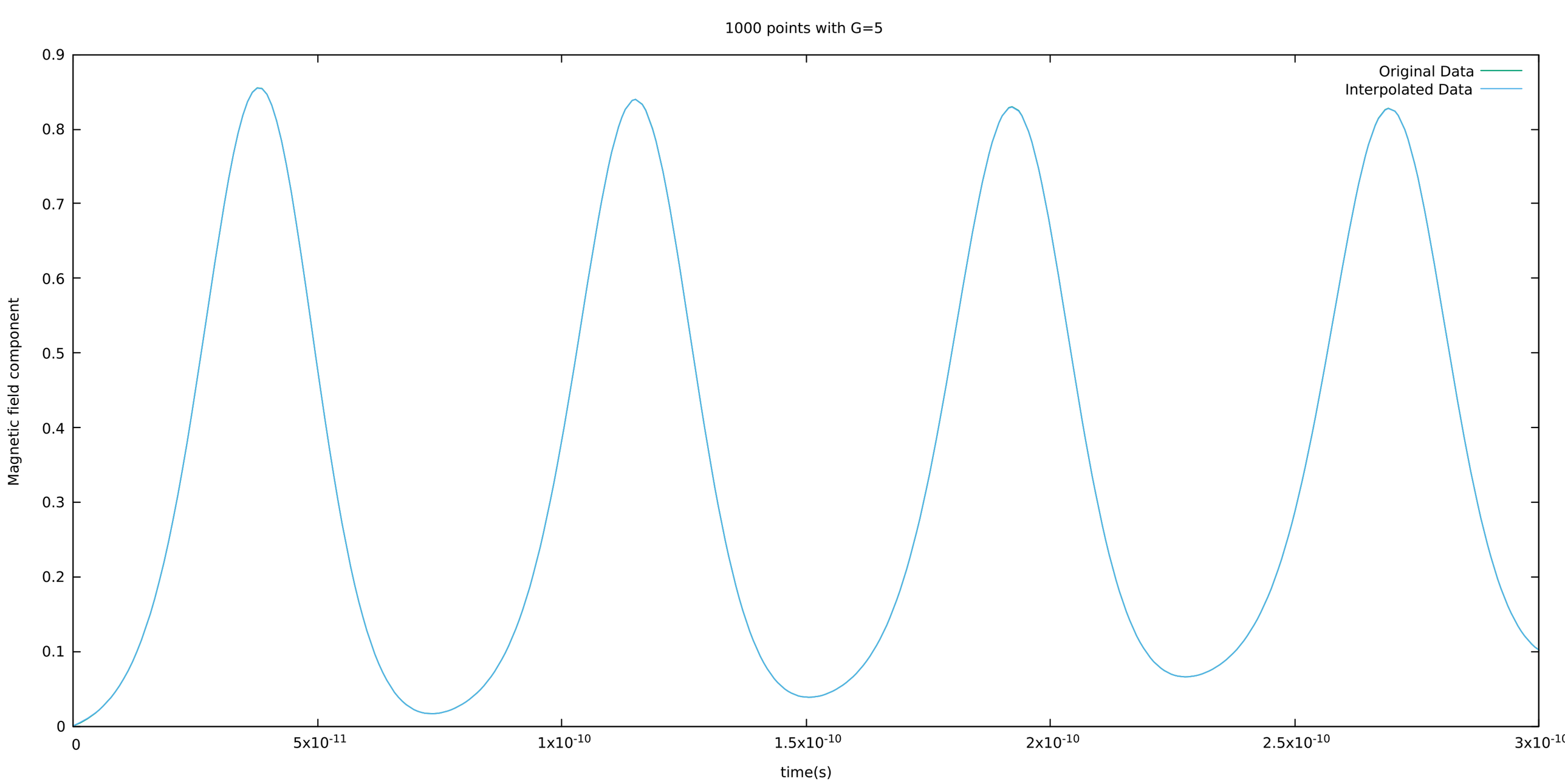
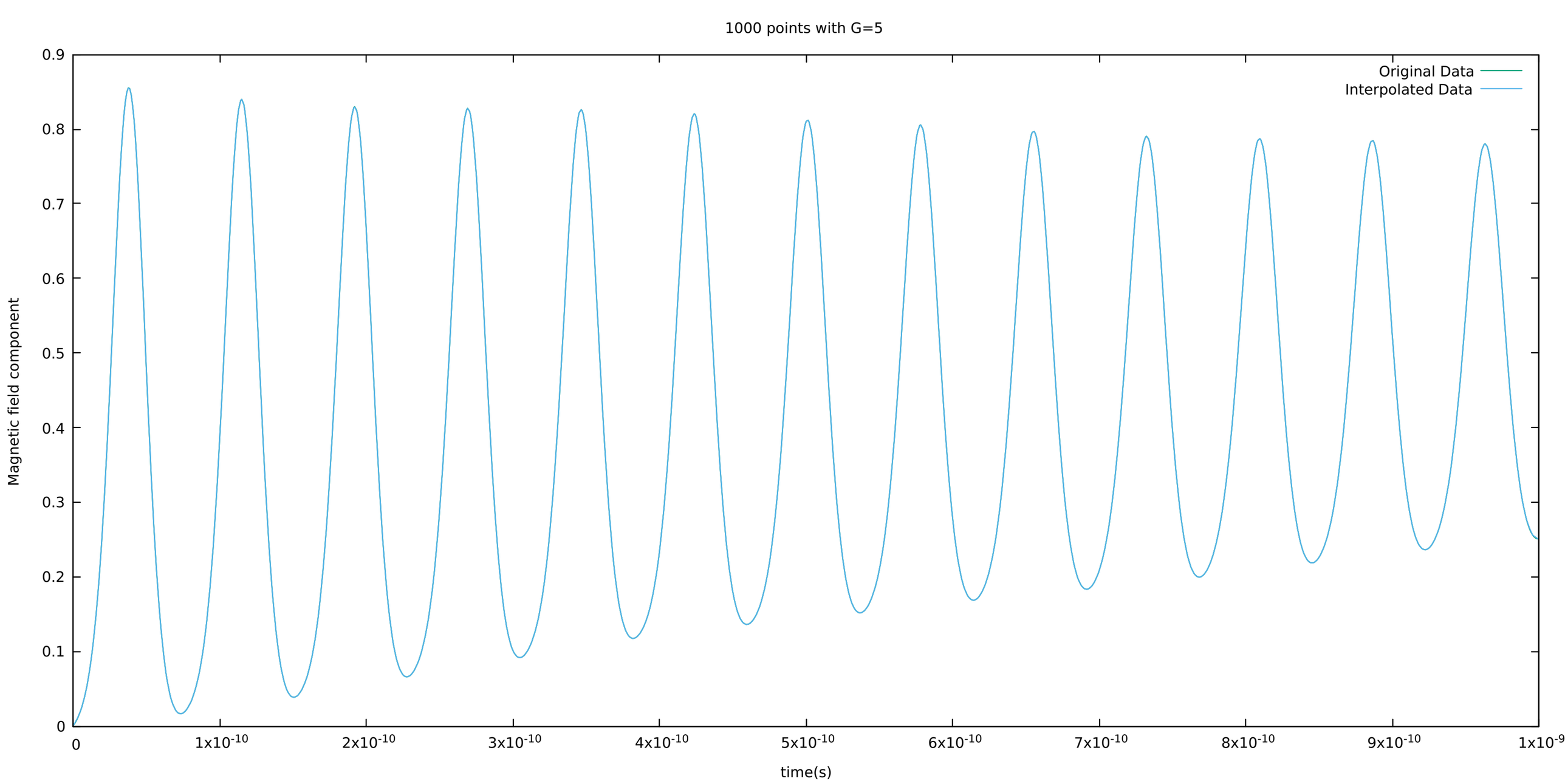
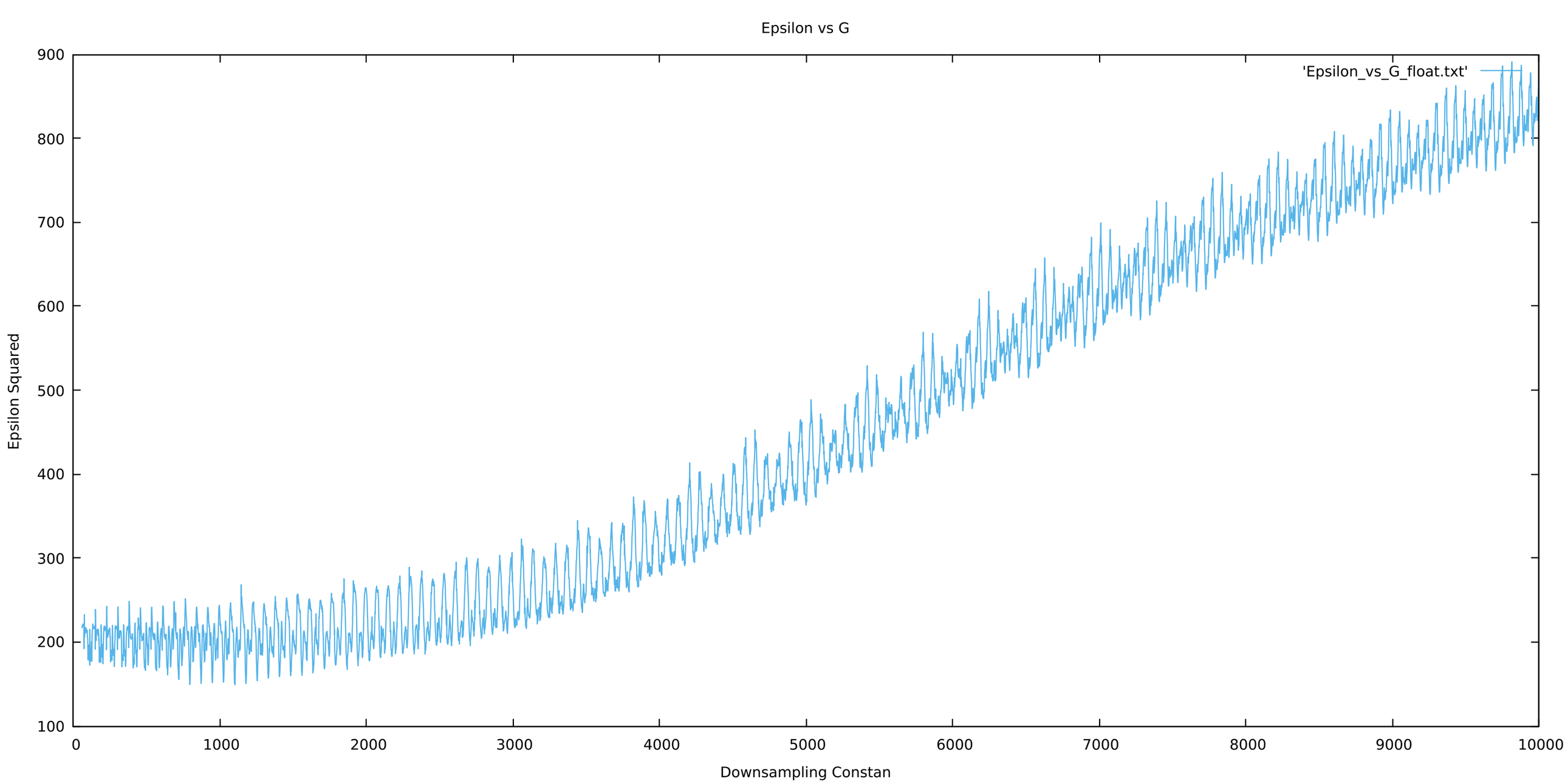

1000 points with G=5
Original Data
Interpolated Data
Magnetic field component
time(s)
0
0.01
0.02
0.03
0.04
0.05
0.06
0
2x10-12
4x10-12
6x10-12
8x10-12
1x10-11


1000 points with G=5
Original Data
Interpolated Data
Magnetic field component
time(s)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
2x10-11
4x10-11
6x10-11
8x10-11
1x10-10


1000 points with G=5
Original Data
Interpolated Data
Magnetic field component
time(s)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
5x10-11
1x10-10
1.5x10-10
2x10-10
2.5x10-10
3x10-10


1000 points with G=5
Original Data
Interpolated Data
Magnetic field component
time(s)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0
1x10-10
2x10-10
3x10-10
4x10-10
5x10-10
6x10-10
7x10-10
8x10-10
9x10-10
1x10-9


Epsilon vs G
'Epsilon_vs_G_float.txt'
Epsilon Squared
Downsampling Constan
900
800
700
600
500
400
300
200
100
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000

1.For G=62

Time Profile for Linear Spline Interpolation without using LU Decomposition

No time accumulated

% time	cumulative seconds	self seconds	calls	self Ts/call	total Ts/call	name
0.00	0.00	0.00	1	0.00	0.00	Downsample
0.00	0.00	0.00	1	0.00	0.00	Interpolate
0.00	0.00	0.00	1	0.00	0.00	Error

Time Profile for Cubic Spline Interpolation using LU Decomposition

% time	cumulative seconds	self seconds	calls	self ms/call	total ms/call	name
98.94	0.89	0.89	1	890.43	890.43	Interpolate
1.11	0.90	0.01				main
0.00	0.90	0.00	1	0.00	0.00	Downsample
0.00	0.90	0.00	1	0.00	0.00	Error

2.For G=100

Time Profile for Linear Spline Interpolation without using LU Decomposition

% time	cumulative seconds	self seconds	calls	self Ts/call	total Ts/call	name
100.11	0.01	0.01				main
0.00	0.01	0.00	1	0.00	0.00	Downsample
0.00	0.01	0.00	1	0.00	0.00	Interpolate
0.00	0.01	0.00	1	0.00	0.00	Error

Time Profile for Cubic Spline Interpolation using LU Decomposition

% time	cumulative seconds	self seconds	calls	self ms/call	total ms/call	name
93.15	0.27	0.27	1	270.13	270.13	Interpolate
3.45	0.28	0.01	1	10.00	10.00	Error
3.45	0.29	0.01				main
0.00	0.29	0.00	1	0.00	0.00	Downsample

3.For G=500

Time Profile for Linear Spline Interpolation without using LU Decomposition

% time	cumulative seconds	self seconds	calls	self Ts/call	total Ts/call	name
100.11	0.01	0.01				main
0.00	0.01	0.00	1	0.00	0.00	Downsample
0.00	0.01	0.00	1	0.00	0.00	Interpolate
0.00	0.01	0.00	1	0.00	0.00	Error

Time Profile for Cubic Spline Interpolation using LU Decomposition

% time	cumulative seconds	self seconds	calls	self ms/call	total ms/call	name
60.03	0.03	0.03				main
40.02	0.05	0.02	1	20.01	20.01	Interpolate
0.00	0.05	0.00	1	0.00	0.00	Downsample
0.00	0.05	0.00	1	0.00	0.00	Error

4.For G=1000

Time Profile for Linear Spline Interpolation without using LU Decomposition

% time	cumulative seconds	self seconds	calls	self Ts/call	total Ts/call	name
100.11	0.02	0.02				main
0.00	0.02	0.00	1	0.00	0.00	Downsample
0.00	0.02	0.00	1	0.00	0.00	Interpolate
0.00	0.02	0.00	1	0.00	0.00	Error

Time Profile for Cubic Spline Interpolation using LU Decomposition

% time	cumulative seconds	self seconds	calls	self ms/call	total ms/call	name
50.02	0.01	0.01	1	10.00	10.00	Interpolate
50.02	0.02	0.01				main
0.00	0.02	0.00	1	0.00	0.00	Downsample
0.00	0.02	0.00	1	0.00	0.00	Error

As we can see, for the large Data Set,Linear Interpolation without LU Decomposition takes less time but this difference fades away for larger values of the Downsampling constant G.

Furthermore,
Since we are using Dynamic Memory Allocation,if we input a value for the Downsampling Constant less than a Threshold value , we get Segmentation Fault since it is not possible to allot such a large piece of contiguous data due to hardware limitations.

Hence considering the computational power and hardware Limitations, LU Decomposition is not the best way to approach Interpolation.