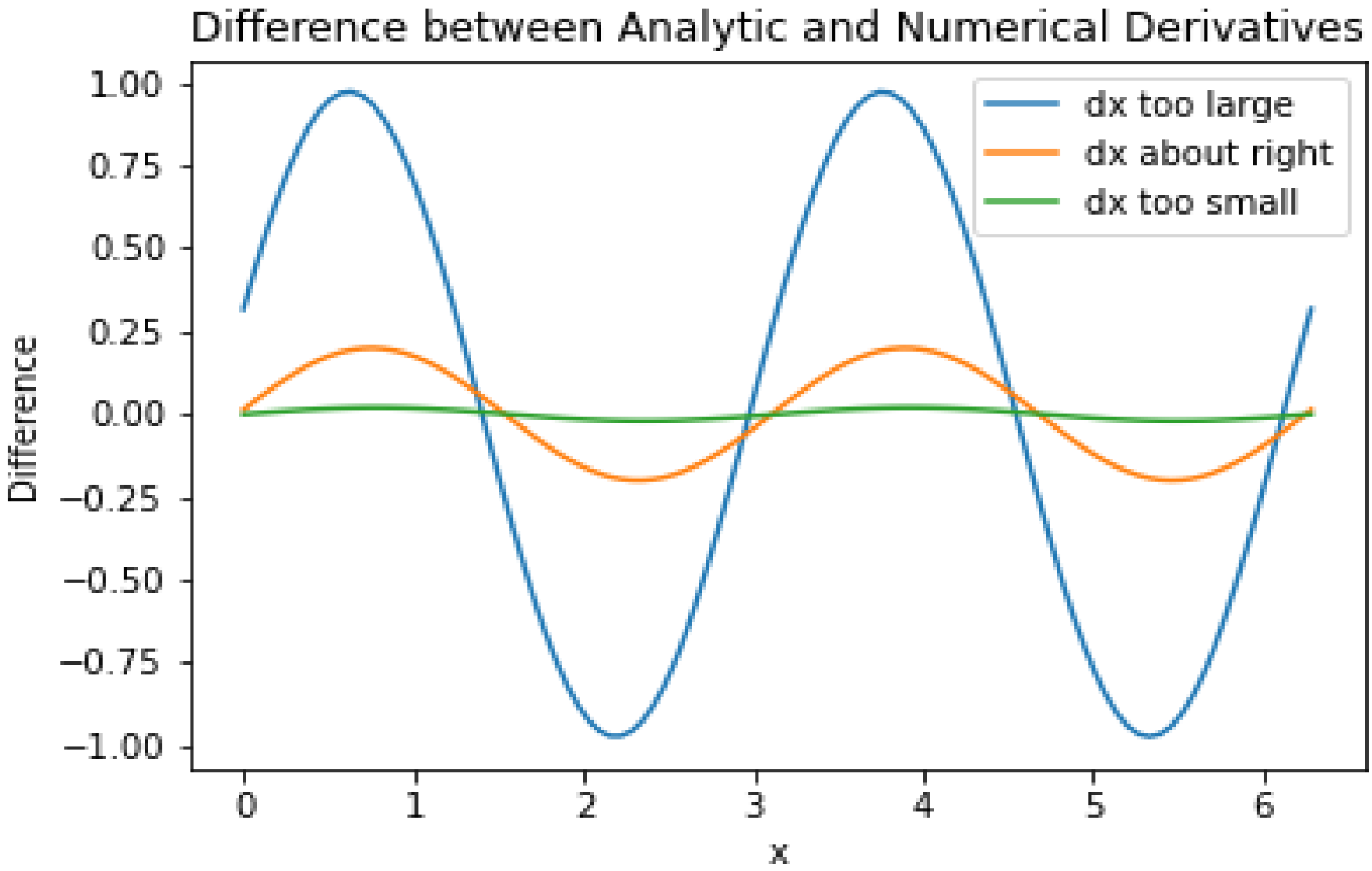
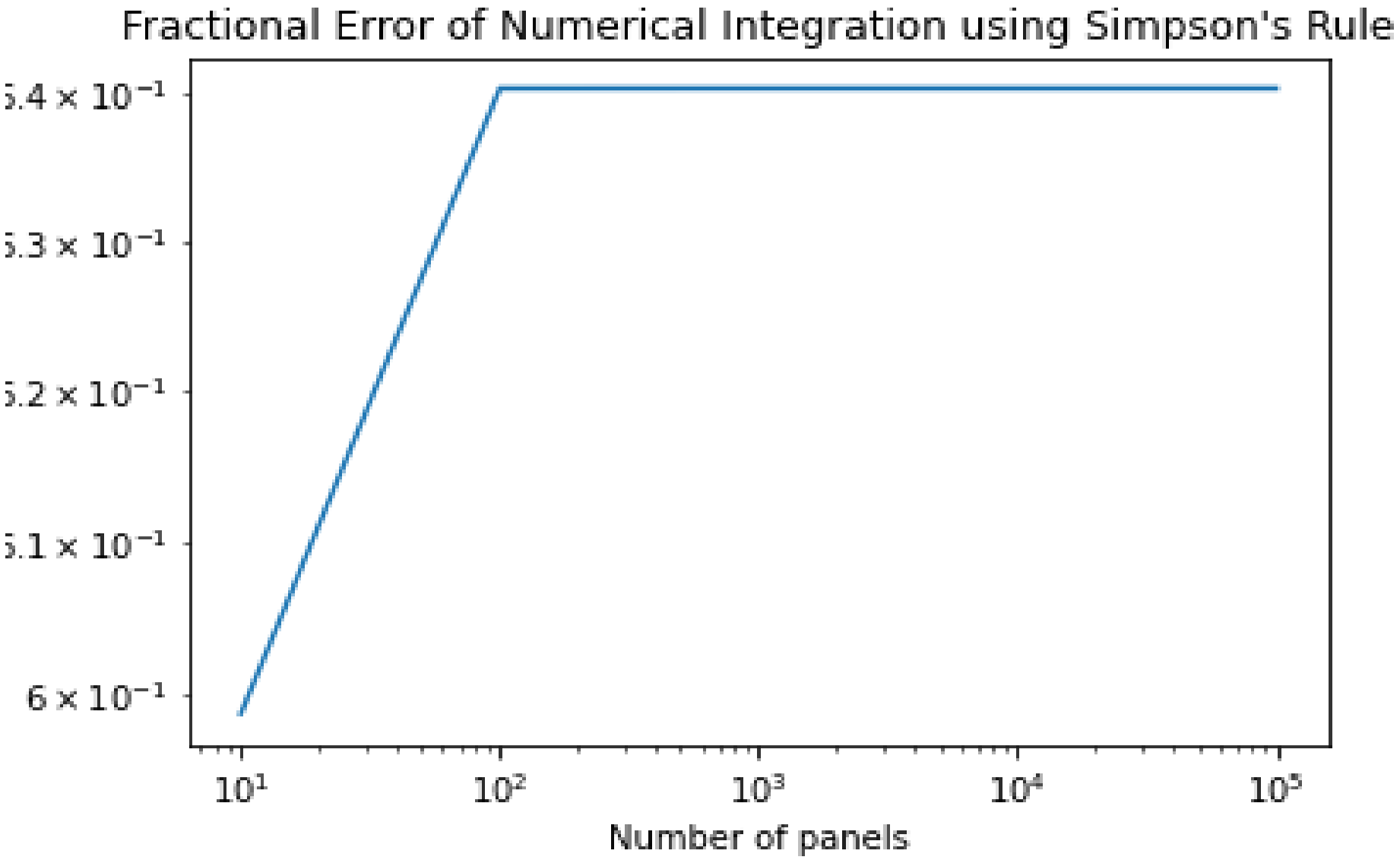
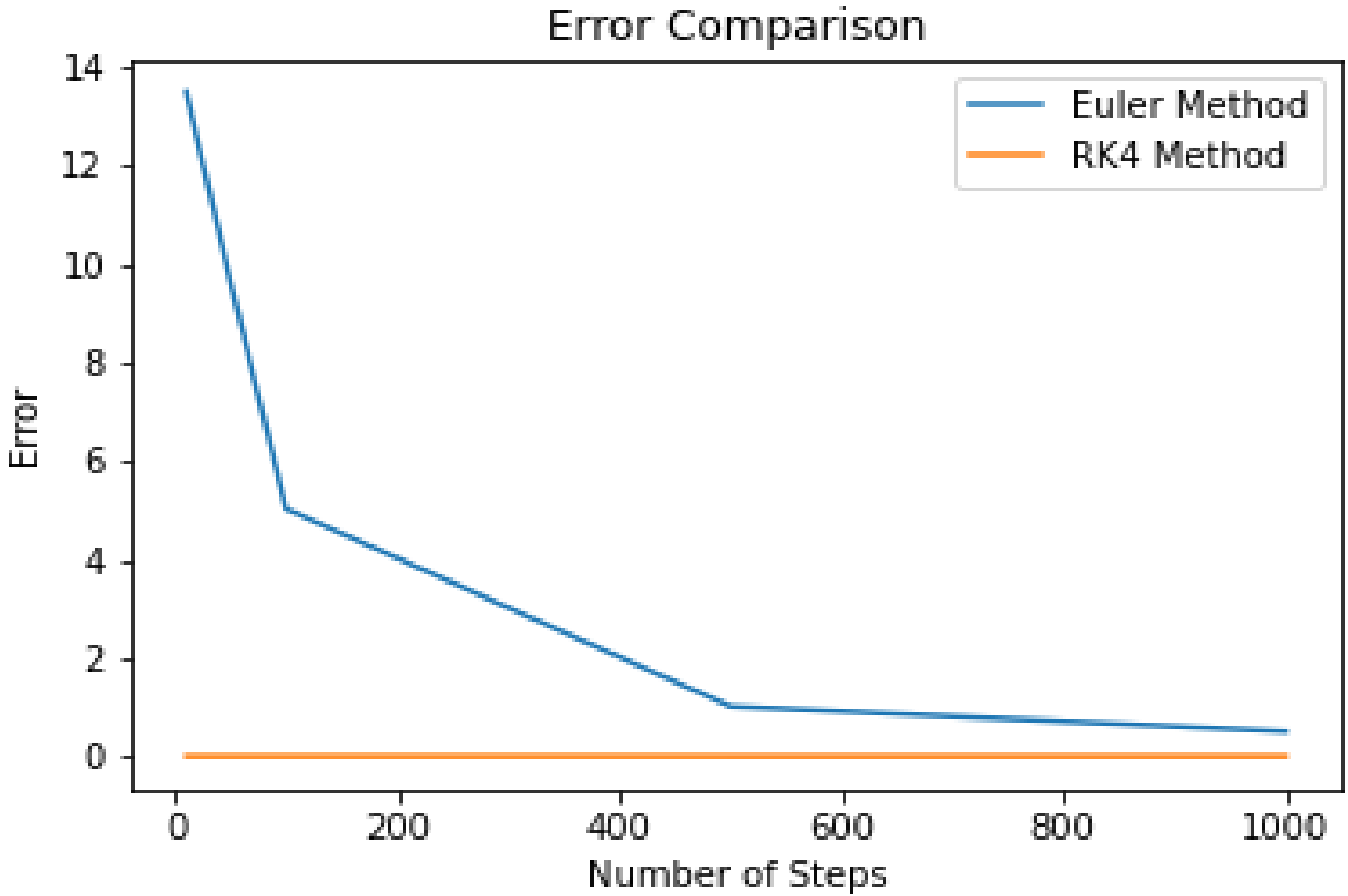
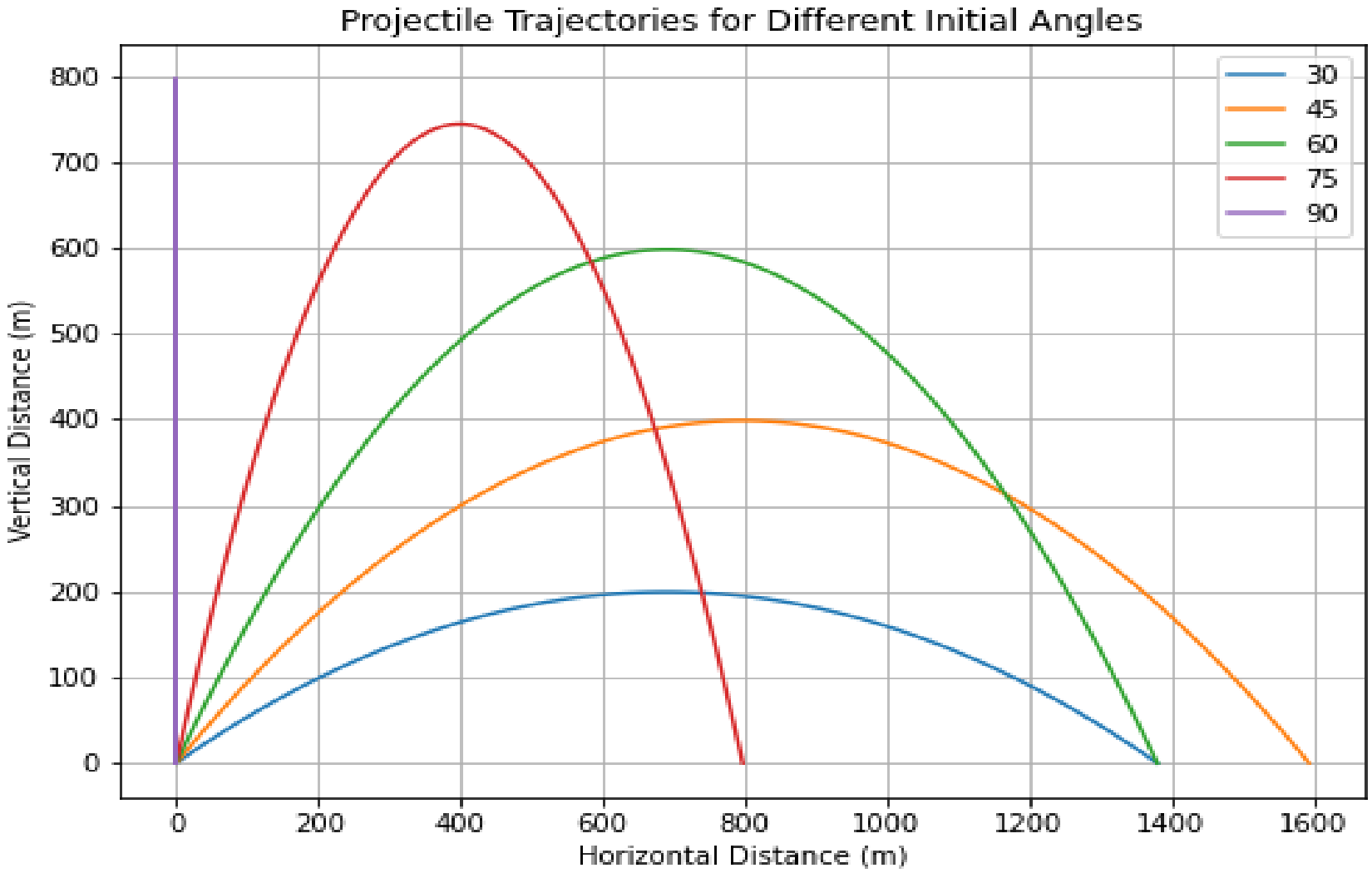
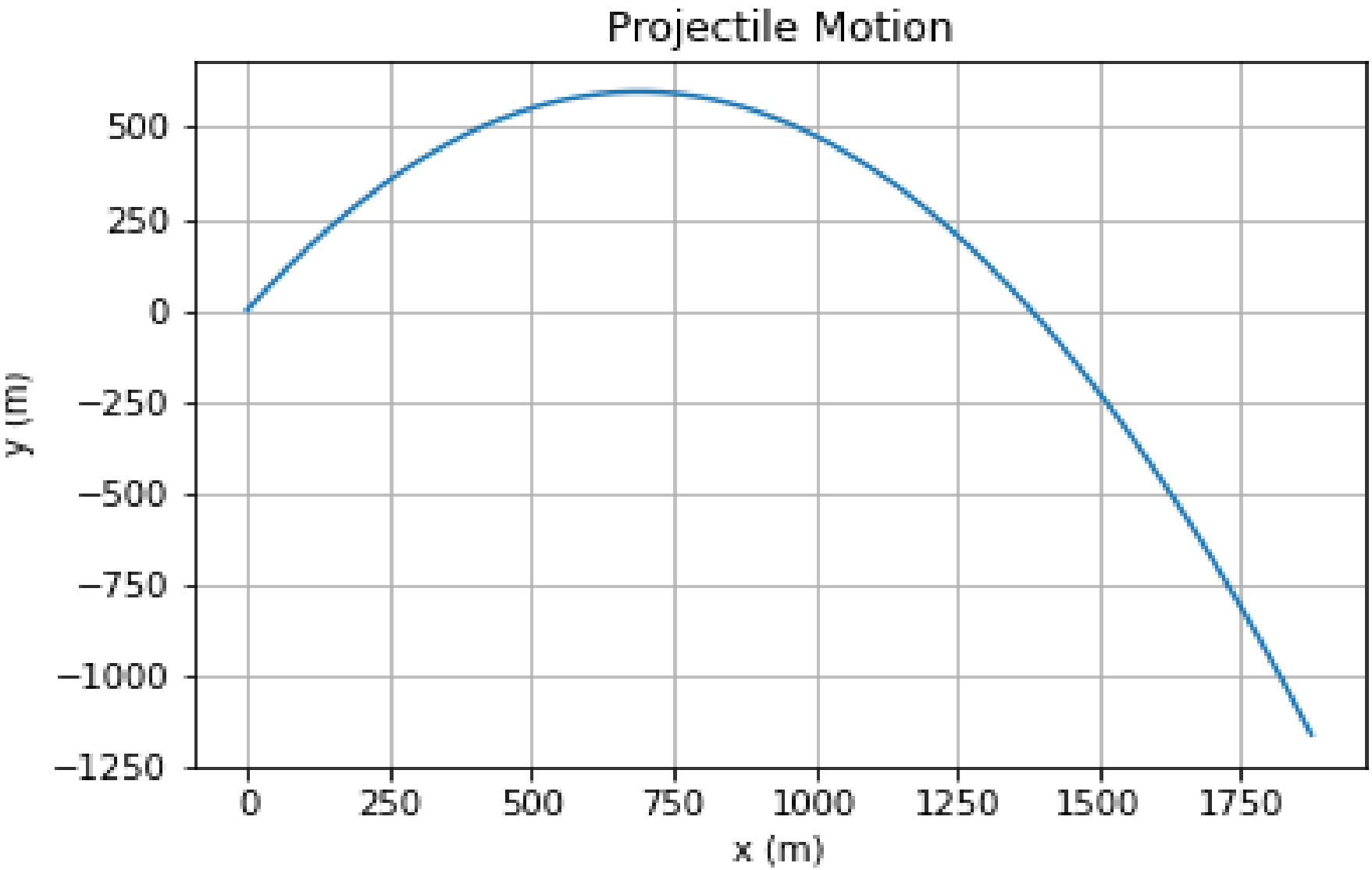
15853

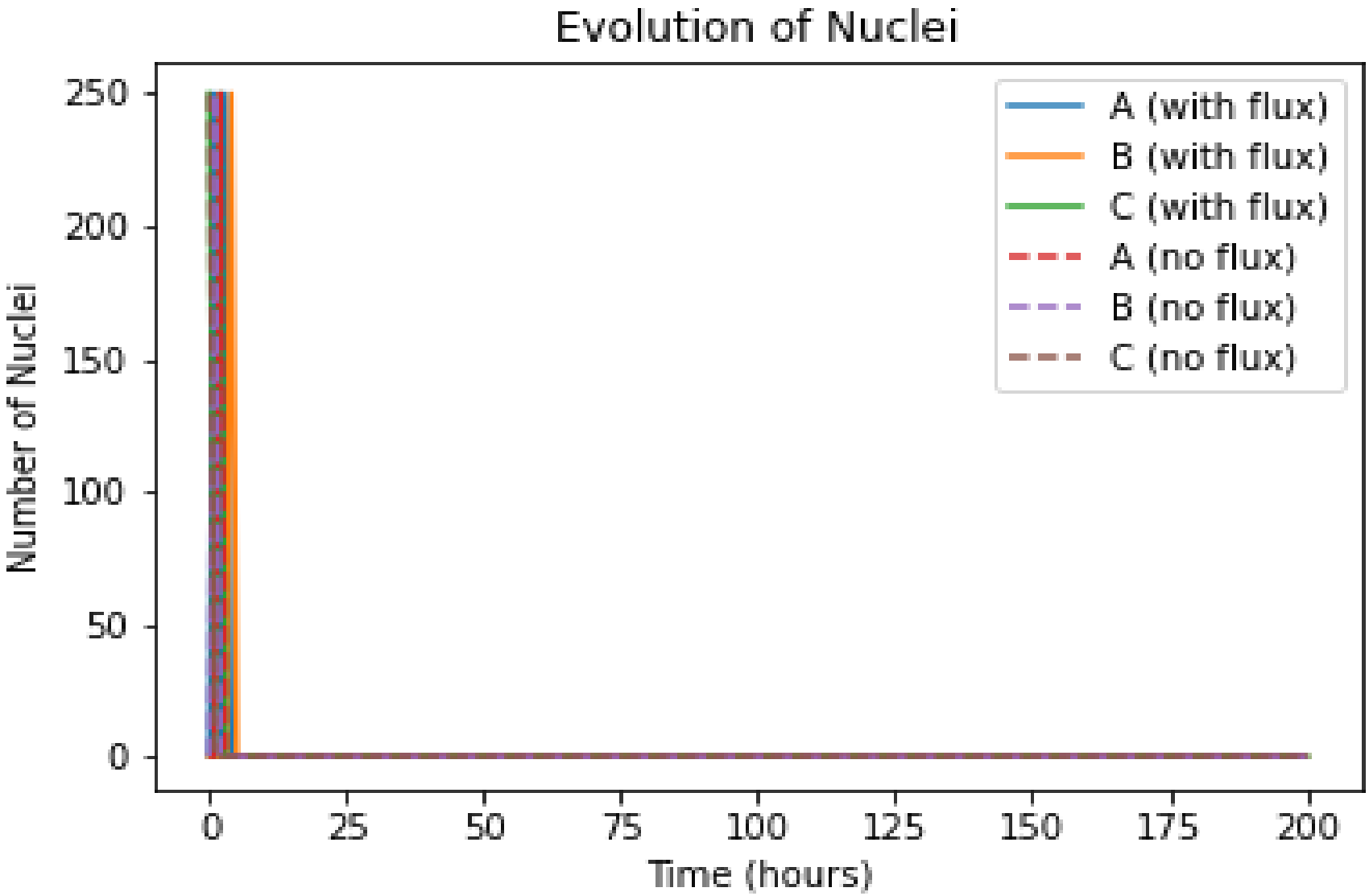

Difference between Analytic and Numerical Derivatives
dx too large
dx about right
dx too small
Difference
x
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
1
2
3
4
5
6

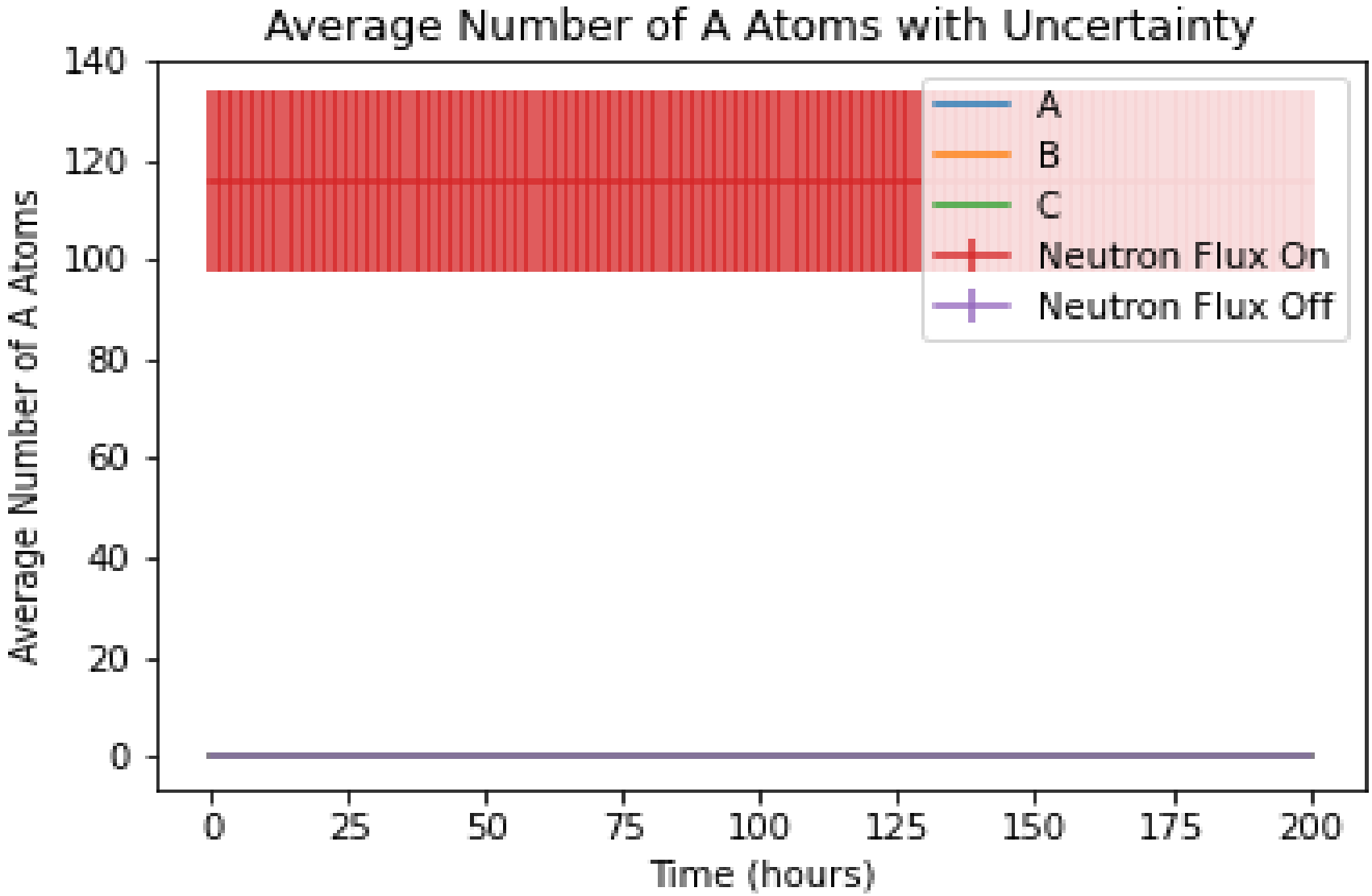

Fractional Error of Numerical Integration using Simpson's Rule
5.4 x 10⁻¹
5.3 x 10⁻¹
5.2 x 10⁻¹
5.1 x 10⁻¹
6 x 10⁻¹
10¹
10²
10³
10⁴
10⁵
Number of panels

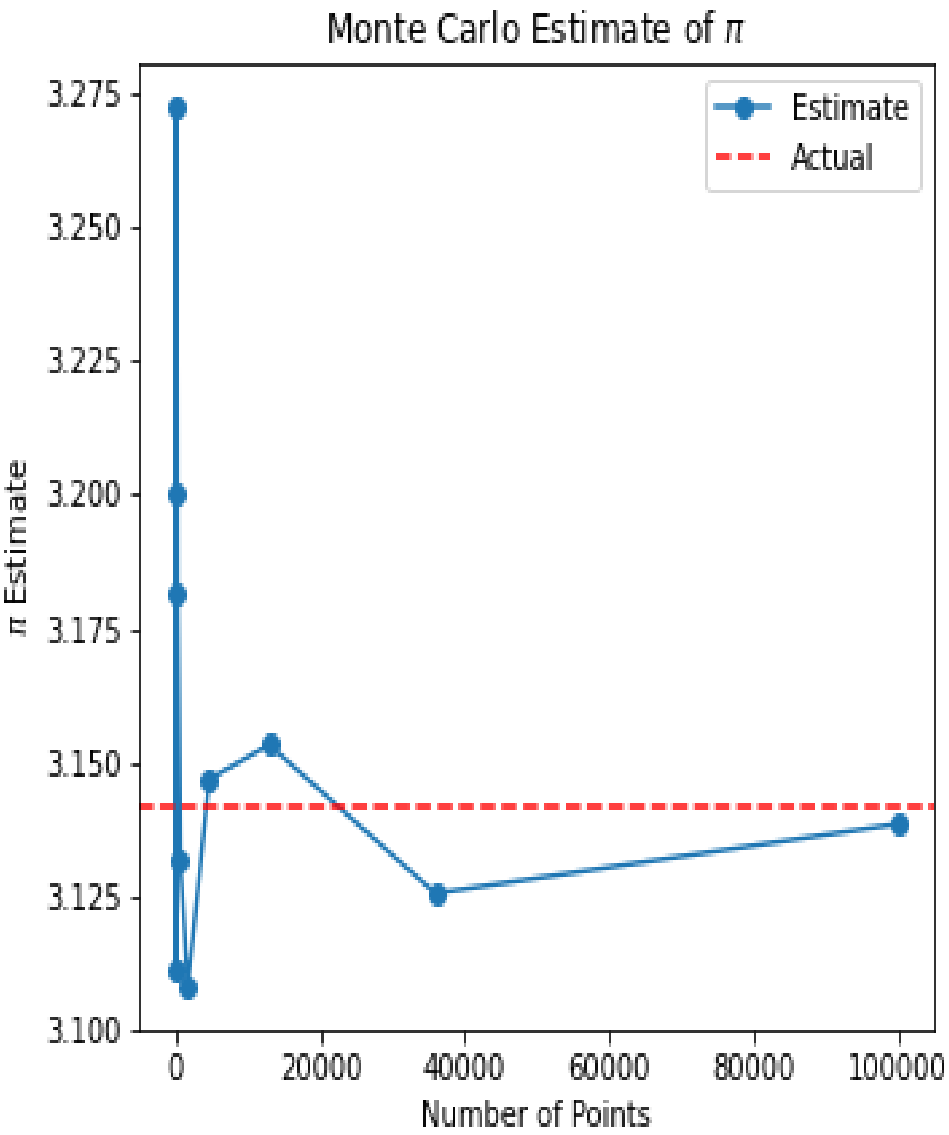

Error Comparison
Euler Method
RK4 Method
Error
Number of Steps
0
2
4
6
8
10
12
14
0
200
400
600
800
1000

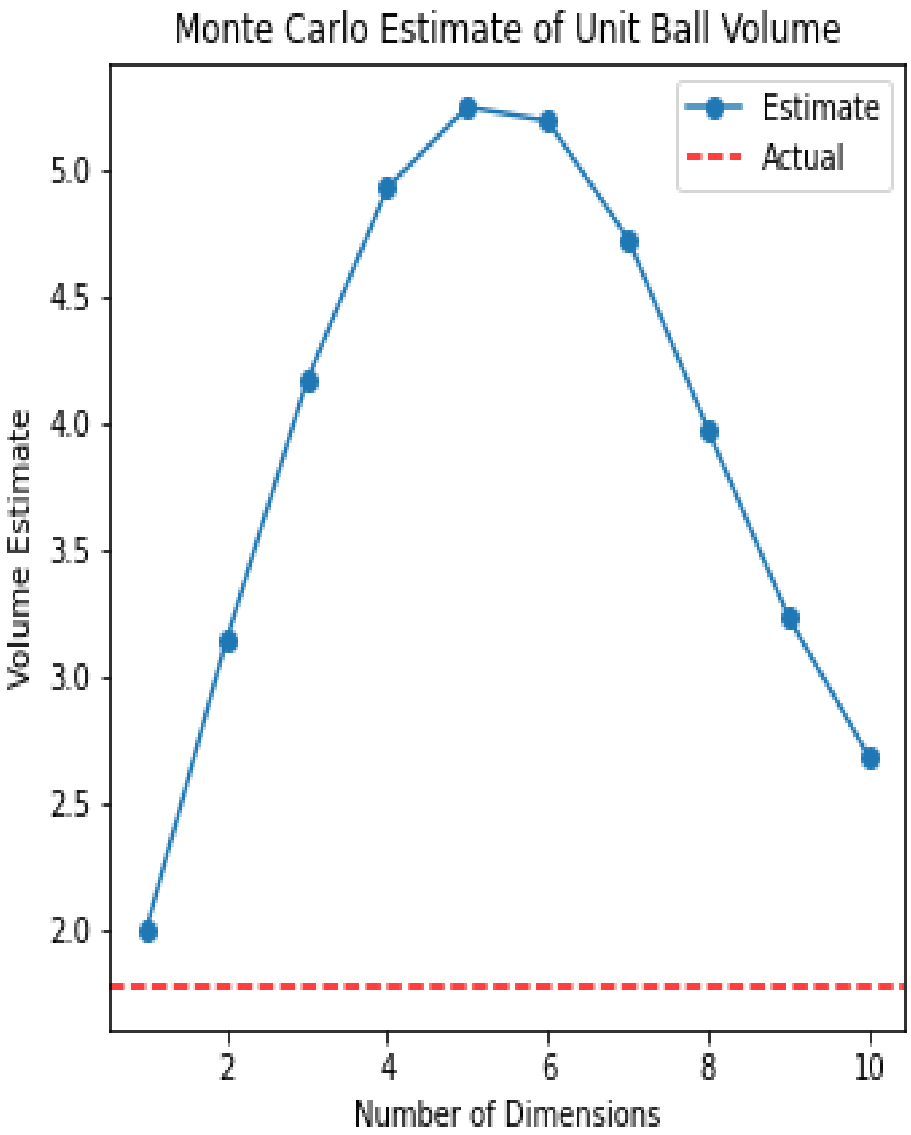

Projectile Trajectories for Different Initial Angles
Vertical Distance (m)
Horizontal Distance (m)
0
100
200
300
400
500
600
700
800
0
200
400
600
800
1000
1200
1400
1600
30
45
60
75
90

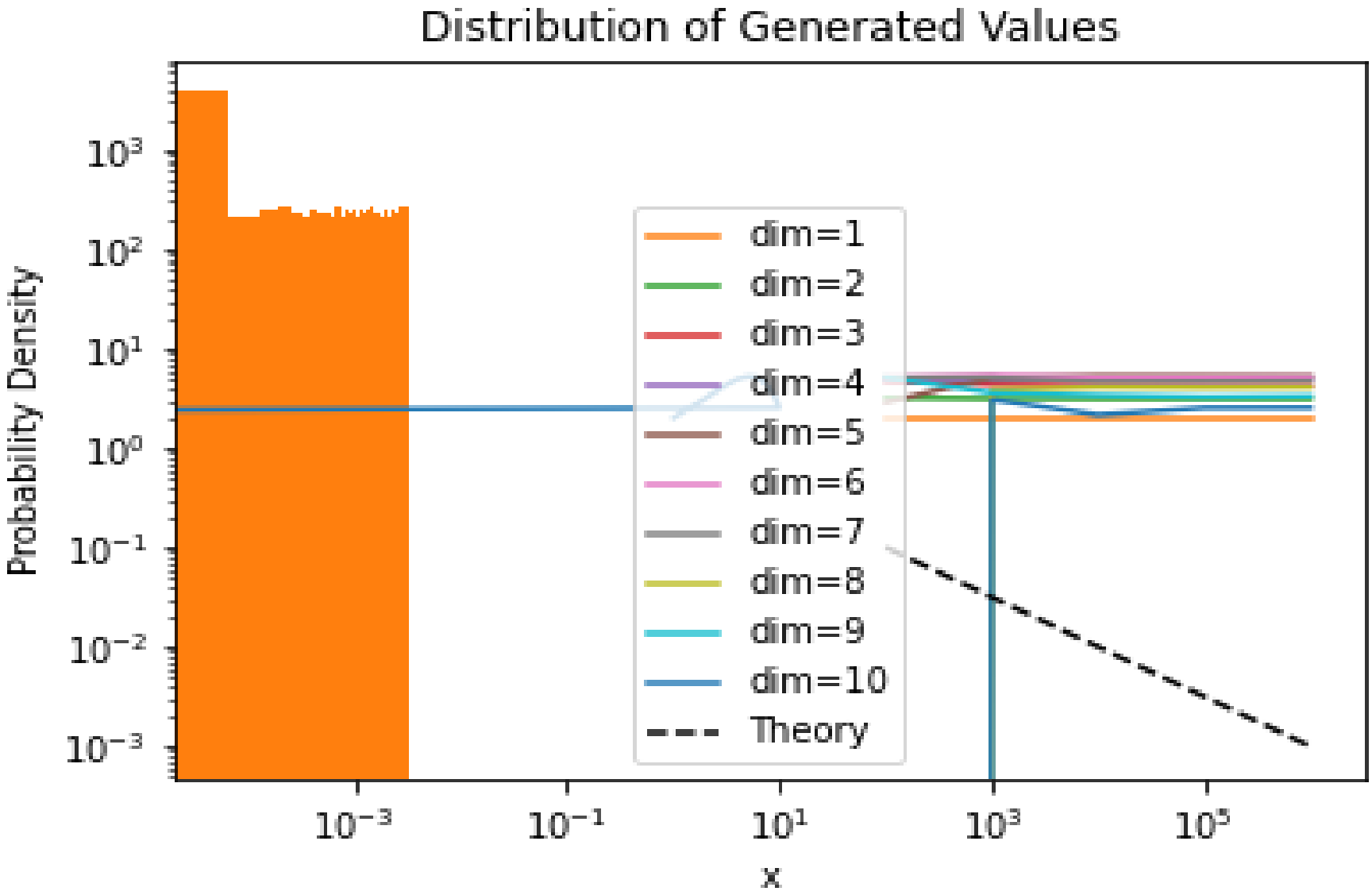

Projectile Motion
500
250
0
−250
−500
−750
−1000
−1250
y (m)
0
250
500
750
1000
1250
1500
1750
x (m)

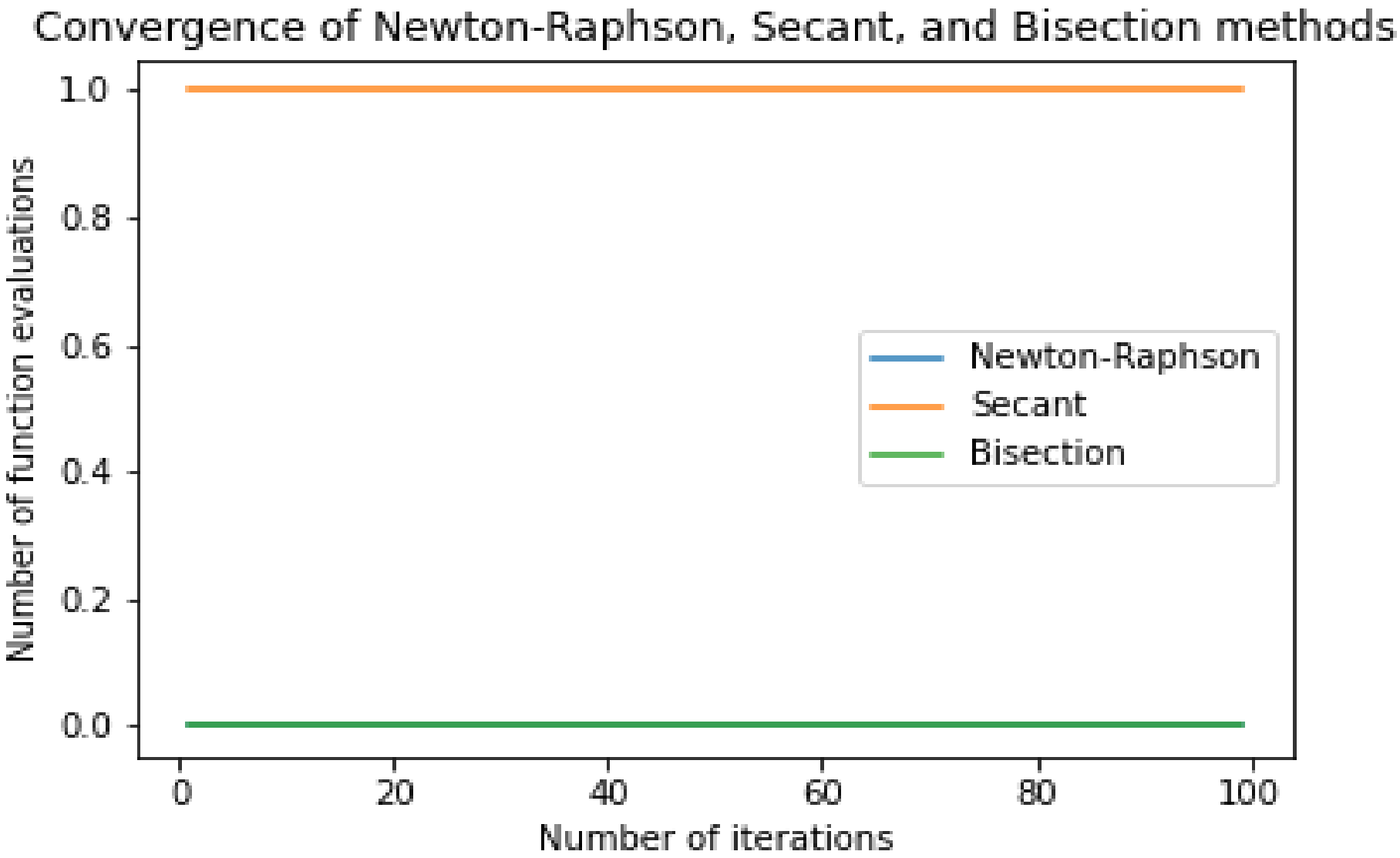

Evolution of Nuclei
Number of Nuclei
Time (hours)
0
50
100
150
200
250
0
25
50
75
100
125
150
175
200
A (with flux)
B (with flux)
C (with flux)
A (no flux)
B (no flux)
C (no flux)

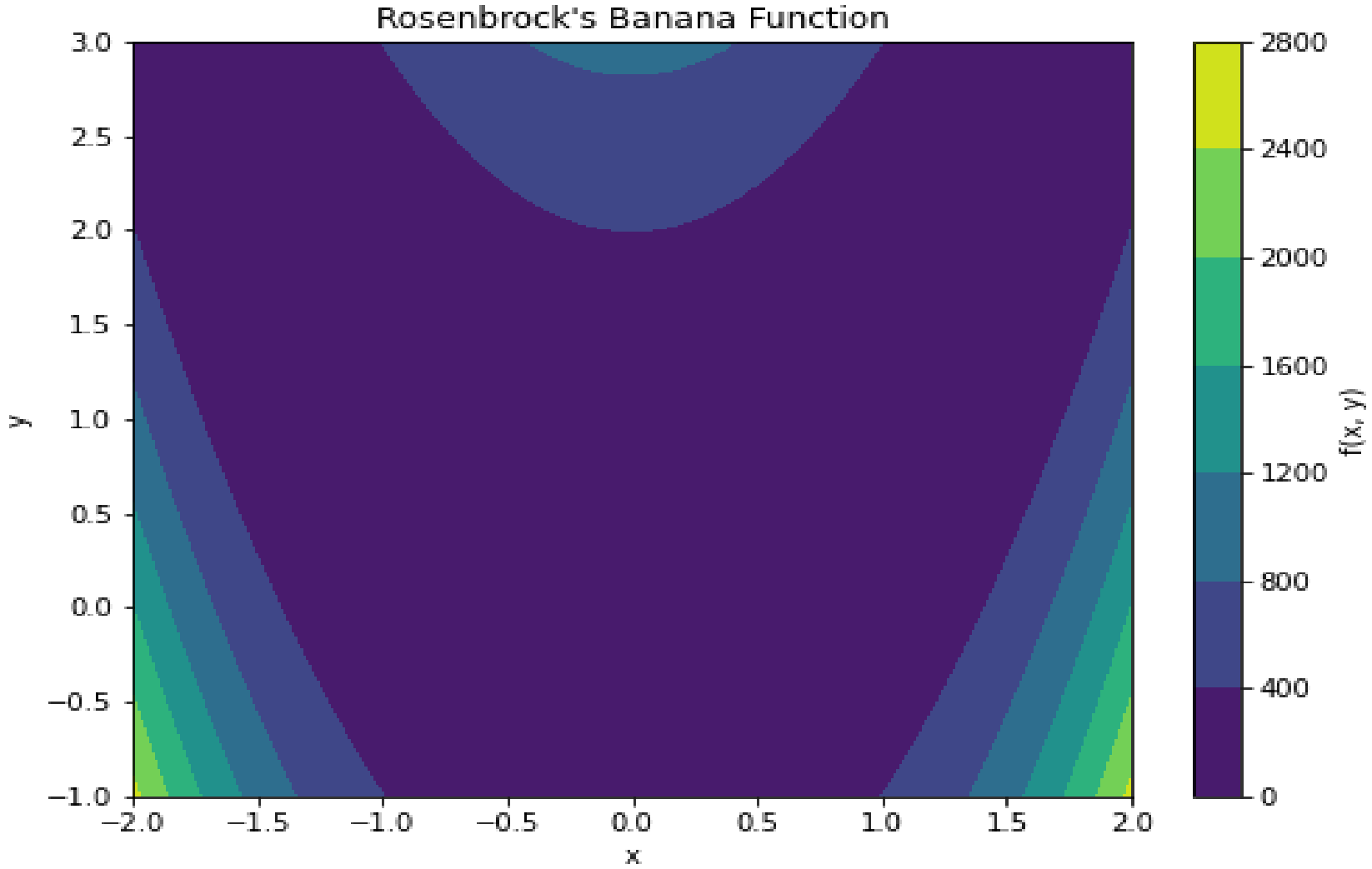

Average Number of A Atoms with Uncertainty
Average Number of A Atoms
Time (hours)
0
20
40
60
80
100
120
140
0
25
50
75
100
125
150
175
200
A
B
C
Neutron Flux On
Neutron Flux Off

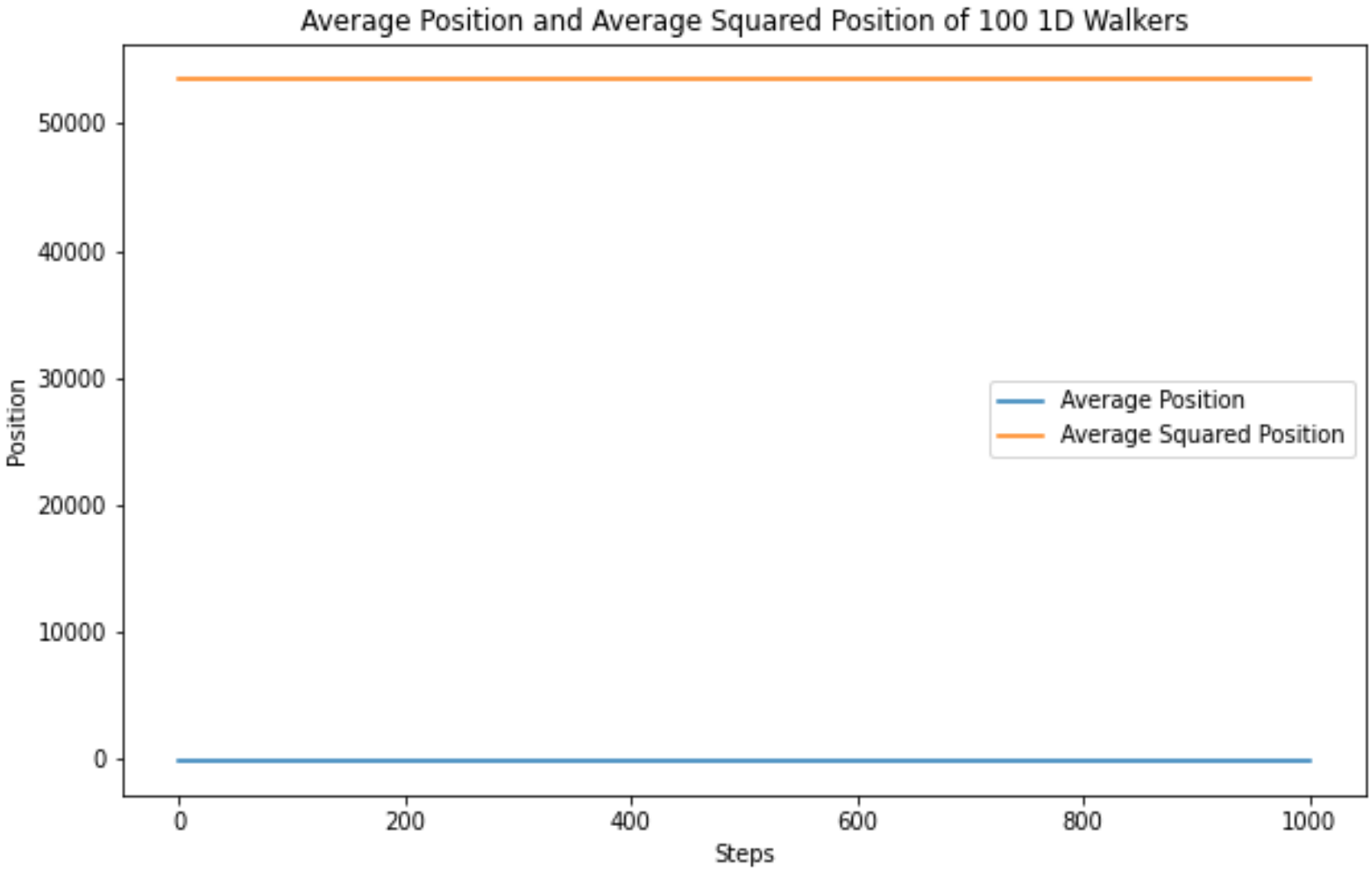

Monte Carlo Estimate of π
Estimate
Actual
π Estimate
3.275
3.250
3.225
3.200
3.175
3.150
3.125
3.100
0
20000
40000
60000
80000
100000
Number of Points

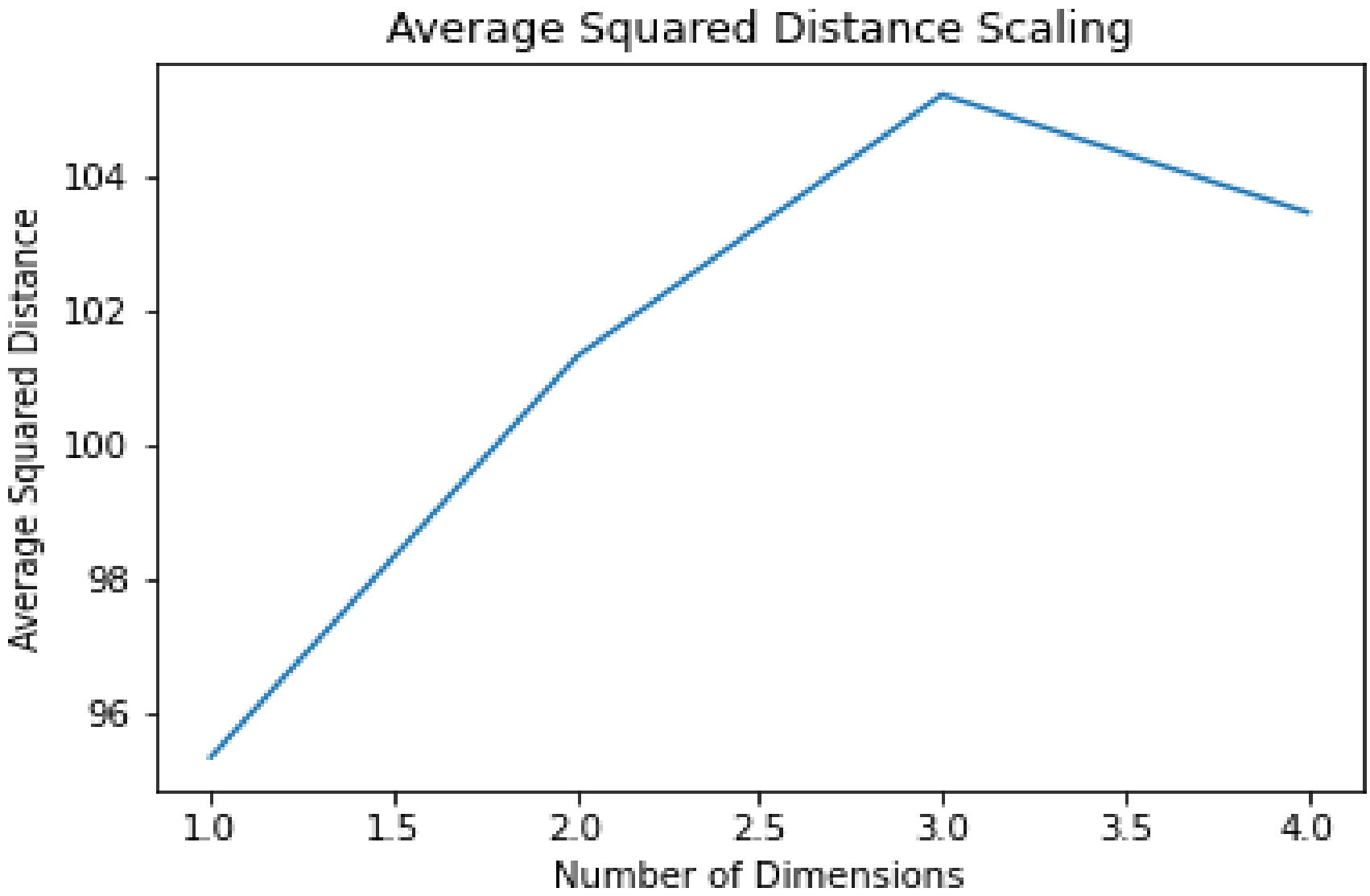

Monte Carlo Estimate of Unit Ball Volume
Estimate
Actual
Volume Estimate
5.0
4.5
4.0
3.5
3.0
2.5
2.0
2
4
6
8
10
Number of Dimensions

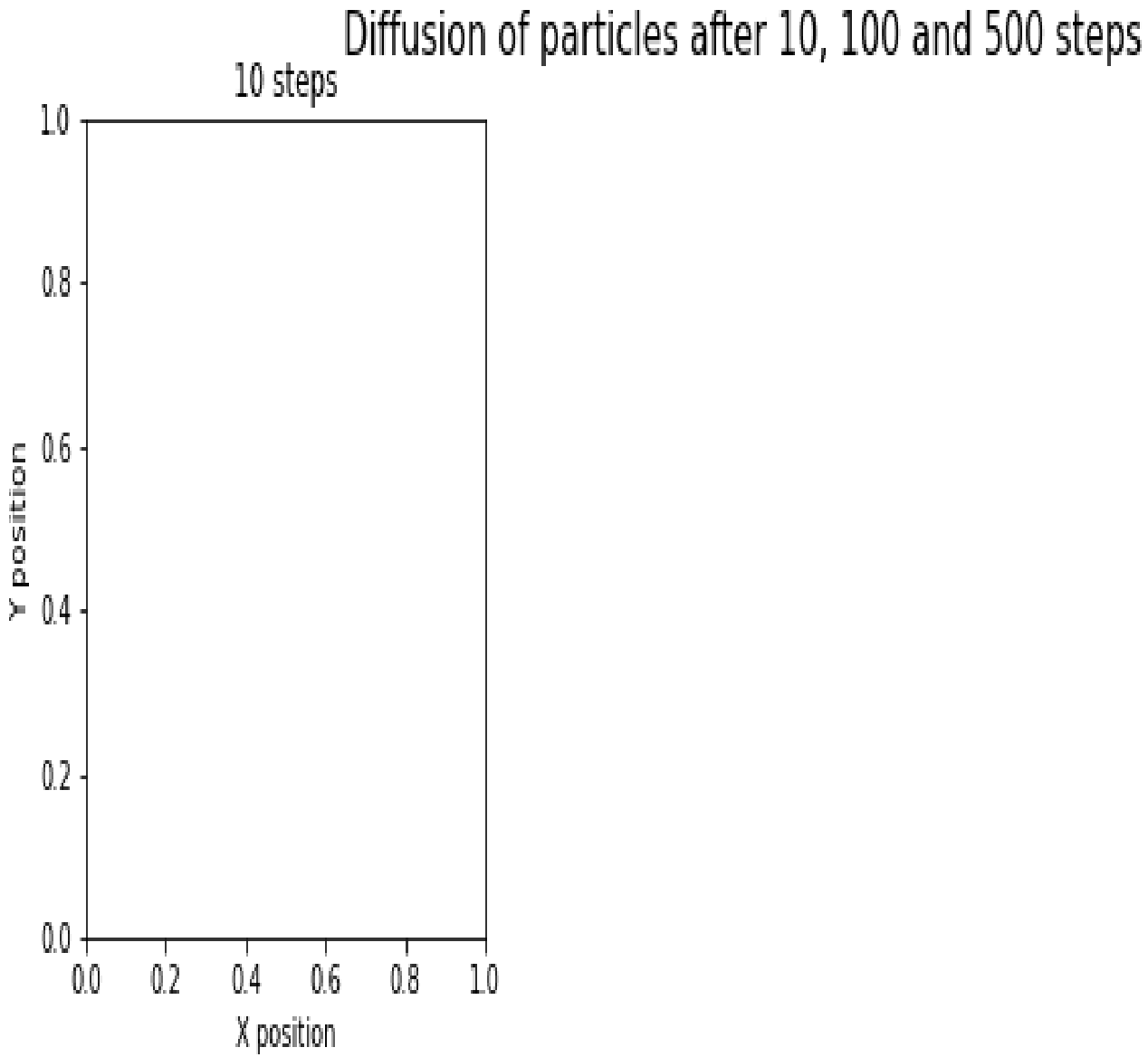

Distribution of Generated Values
Probability Density
10^{3}
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-3}
10^{-1}
10^{1}
10^{3}
10^{5}
x
dim=1
dim=2
dim=3
dim=4
dim=5
dim=6
dim=7
dim=8
dim=9
dim=10
Theory


Convergence of Newton-Raphson, Secant, and Bisection methods
Number of function evaluations
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
100
Number of iterations
Newton-Raphson
Secant
Bisection


Rosenbrock's Banana Function
3.0
2.5
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
y
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0
x
2800
2400
2000
1600
1200
800
400
0
f(x, y)


Average Position and Average Squared Position of 100 1D Walkers
Position
Steps
0
10000
20000
30000
40000
50000
0
200
400
600
800
1000
Average Position
Average Squared Position


Average Squared Distance Scaling
Average Squared Distance
104
102
100
98
96
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Number of Dimensions


Diffusion of particles after 10, 100 and 500 steps
10 steps
Y position
X position
0.0
0.2
0.4
0.6
0.8
1.0

AI?