Lorenz Attractor Experiment

Parametric study using the Euler approach

Experiment conducted on Thursday, the 29th of July 2021, at 12:45:22

The following parameters were selected for the experiment:

1. Constants:

   σ = (10, 10, 10, 14, 14)

   β = (8/3, 8/3, 8/3, 8/3, 13/3)

   ρ = (6, 16, 28, 28, 28)

2. Initial Conditions:

   x_0= 0.8

   y_0= 1.0

   z_0= 1.0

3. Sampling:

   Number of samples: N = 8000

   Sampling frequency: Δt = 0.009300000000000001

Experiment conducted using a computer with:

Python version: 3.8.5

Python build: Sep 3 2020 21:29:08

Operating system: Windows

Operating platform: Windows-10-10.0.19041-SP0

Processor: Intel64 Family 6 Model 165 Stepping 2, GenuineIntel

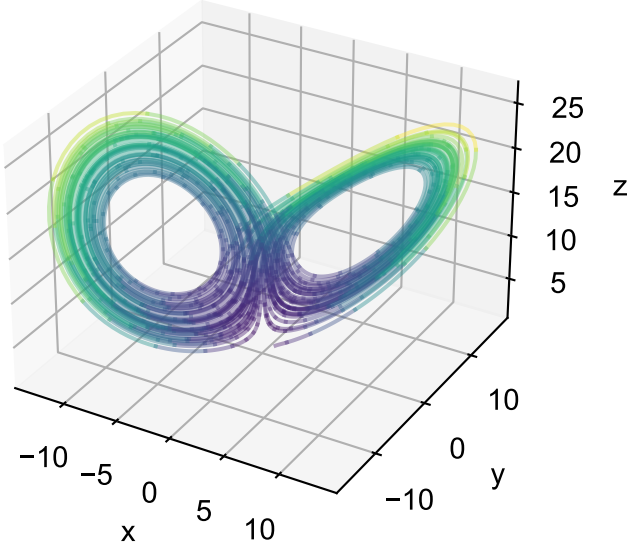
RAM installed: 34.06 GB

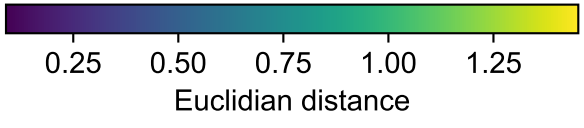
Total experiment elapsed time: 0.4855898000000707

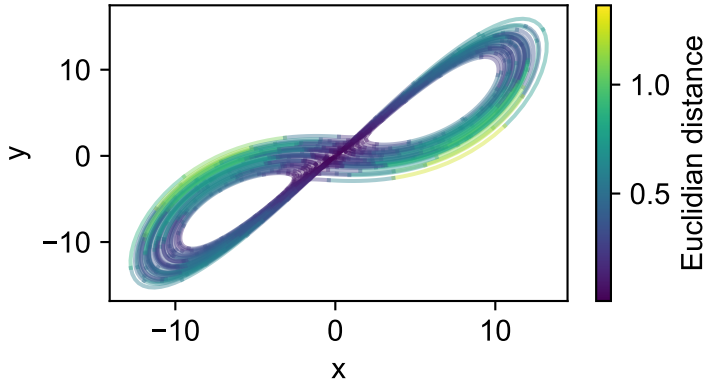
For each set of constants, 3D and 2D plots are given below:

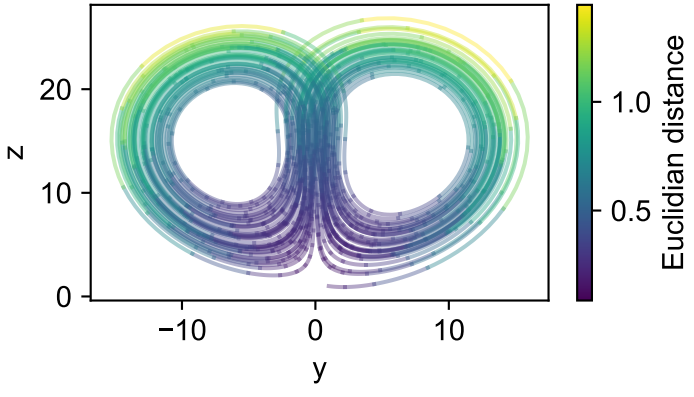
Lorenz Attractor

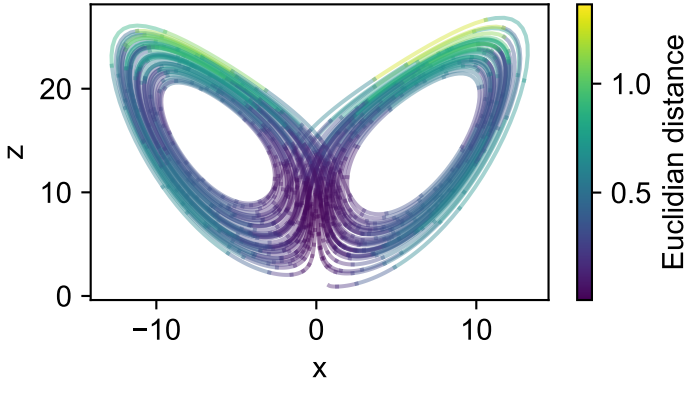
(x, y, z) = (0.8, 1.0, 1.0)
(σ, β, ρ) = (10.0, 8/3, 16.0)
(dt, N) = (0.009300000000000001, 8000)
Elapsed coordinates computation time: 0.09660470000005716





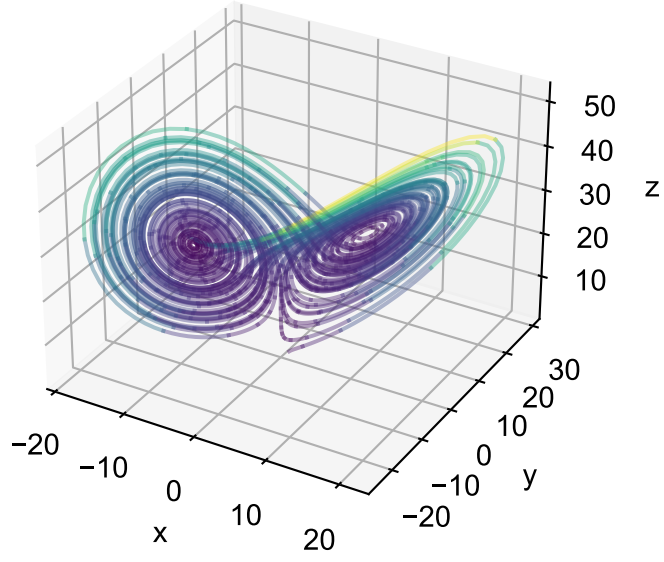


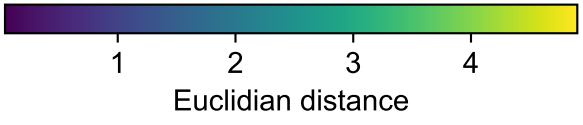


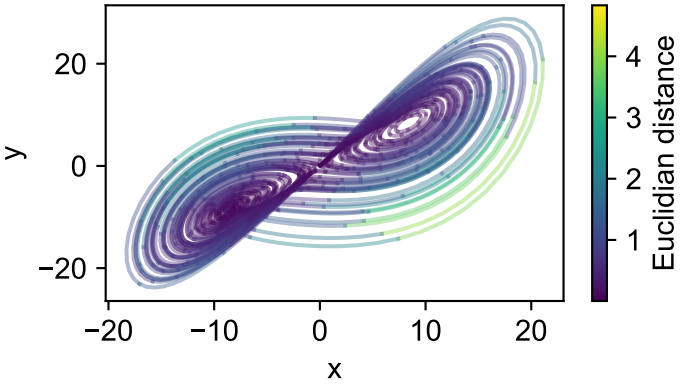


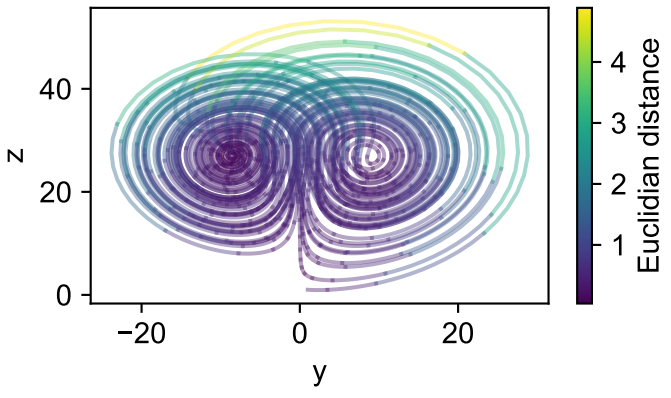
Lorenz Attractor

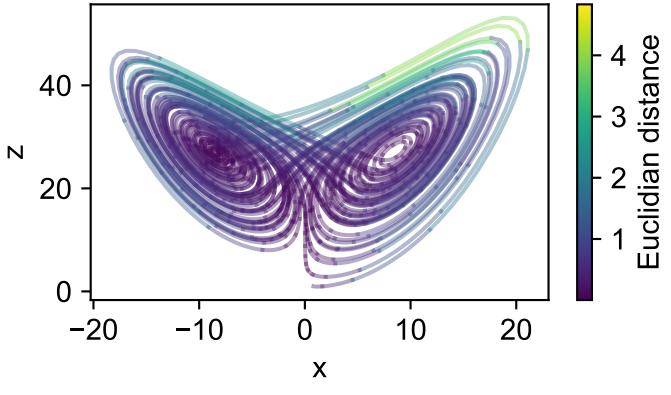
(x, y, z) = (0.8, 1.0, 1.0)
(σ, β, ρ) = (10.0, 8/3, 28.0)
(dt, N) = (0.009300000000000001, 8000)
Elapsed coordinates computation time: 0.09717079999995804











Lorenz Attractor

(x, y, z) = (0.8, 1.0, 1.0)
(σ, β, ρ) = (10.0, 8/3, 6.0)
(dt, N) = (0.009300000000000001, 8000)
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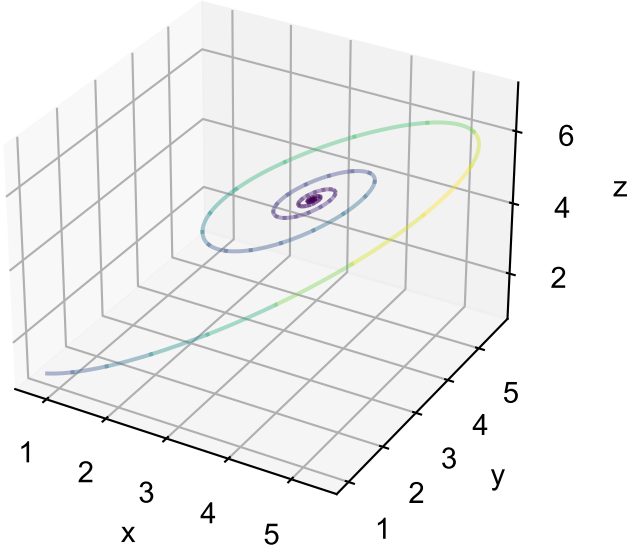

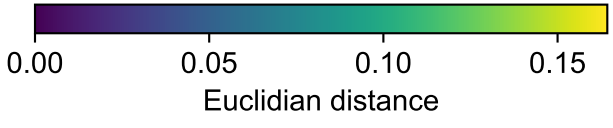

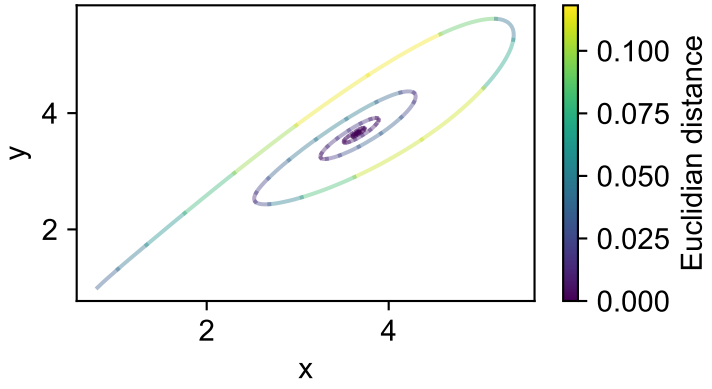

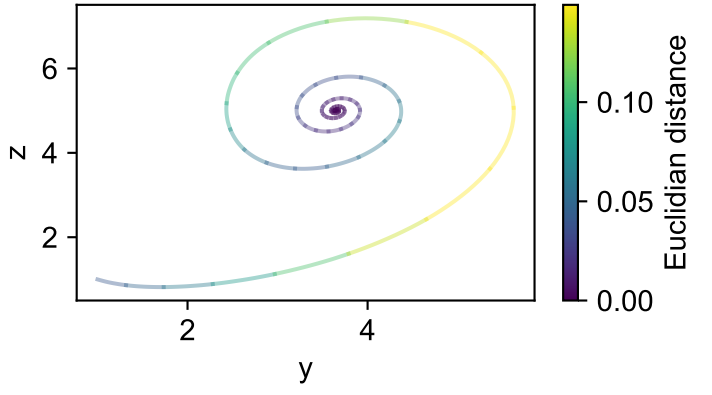

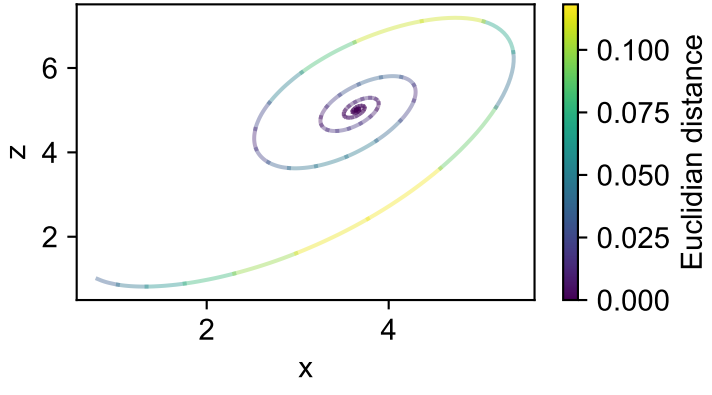

Lorenz Attractor

(x, y, z) = (0.8, 1.0, 1.0)
(σ, β, ρ) = (14.0, 8/3, 28.0)
(dt, N) = (0.009300000000000001, 8000)
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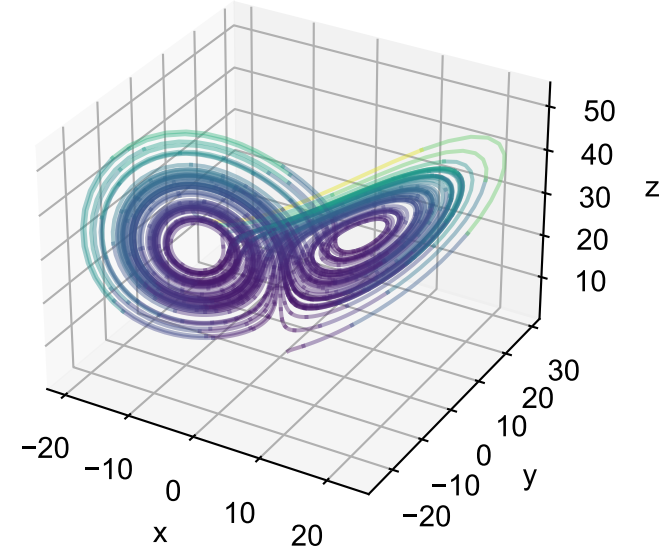

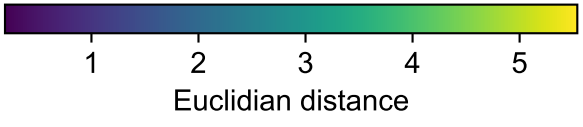

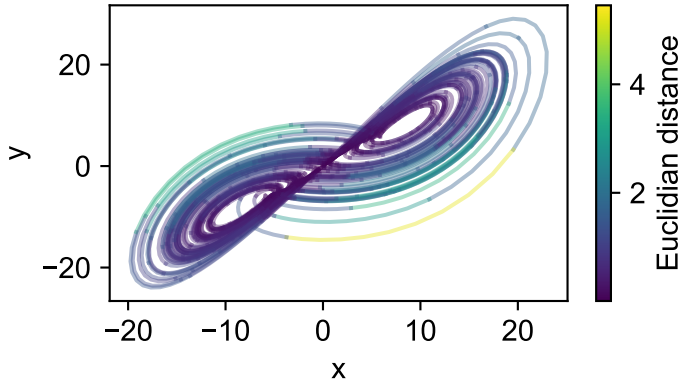

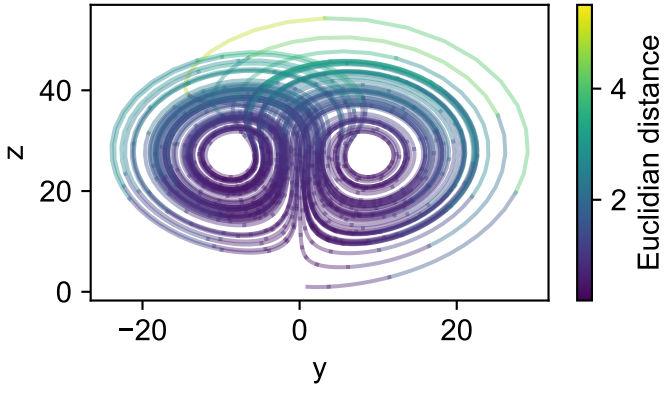

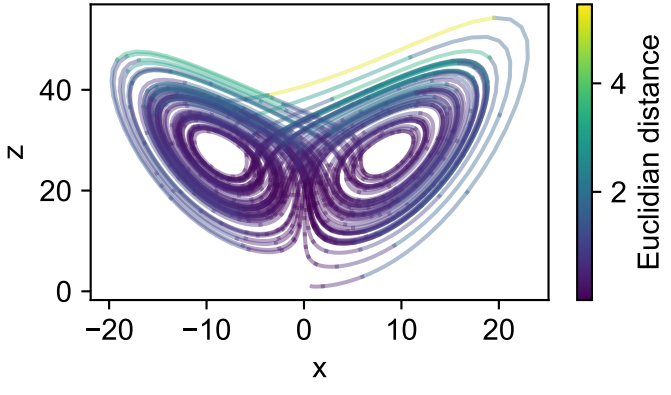

Lorenz Attractor

(x, y, z) = (0.8, 1.0, 1.0)
(σ, β, ρ) = (14.0, 13/3, 28.0)
(dt, N) = (0.009300000000000001, 8000)
Elapsed coordinates computation time: 0.09798169999999118