```
final simplex: (array([[6.03130574e+02, 6.30827632e+03, 1.36179965e+03, 1.09199423e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619967e+00,
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   [6.03130574e+02, 6.30827625e+03, 1.36179972e+03, 1.09199425e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619967e+00,
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   [6.03130585e+02, 6.30827626e+03, 1.36179971e+03, 1.09199427e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619967e+00,
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   [6.03130574e+02, 6.30827629e+03, 1.36179971e+03, 1.09199427e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619968e+00, \\ 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00], \\
                                                                                                   [6.03130574e+02, 6.30827626e+03, 1.36179970e+03, 1.09199425e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619969e+00,
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   [6.03130572e+02, 6.30827626e+03, 1.36179968e+03, 1.09199425e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619968e+00,
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   [6.03130570e+02, 6.30827627e+03, 1.36179972e+03, 1.09199426e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
1.91617561e+03, 1.8874240 ---- 4Converged 8e-03, 8.20433340e-01,
                                                                                                   6.83835638e+02, 3.2464380 e+0 Converged 5e-04, 3.30619969e+00, 6.32148081e-01, 9.72768210e-01, Converged 6e+03, 1.91933916e+00], [6.03130576e+02, 6.8082763 e+0 Converged 6e+03, 1.09199425e+00,
                                                         4 \times 10^{3}
                                                                                                    1.91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619969e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                         3 \times 10^{3}
                                                                                                   [6.03130585e+02, 6.80827628e+03, 1.36179971e+03, 1.09199428e+00,
                                                                                                    1.91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                     6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619967e+00,
                                                                                                    6.321<del>48081e 01, 9.</del>72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   <u>[6:03130569e+02:6.</u>30827635e+03, 1.36179965e+03, 1.09199425e+00, 1.91617<del>5</del>61e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                     10<sup>-5</sup>
                                                                                    10^{-4}
                                                                                  6 \times 10^{3}
                                                                                                 <u>   </u>[6 03130572e+02, 6.β0827630e+03, 1.36179968e+03, 1.09199425e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01, 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619970e+00,
                                                                                                    6.32148081e 17,972768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                         4 \times 10^{3}
                                                                                                   [6.03130568e+02, 6.80827626e+03, 1.36179972e+03, 1.09199426e+00,
                                                                                                       .91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6\83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619969e+00,
                                                         3 \times 10^{3}
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   [6.03\30571e+02, 6.\30827637e+03, 1.36179962e+03, 1.09199422e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                   \begin{array}{l} 6.83835638e \pm 07.3 \\ 24643802e \pm 04.4.73376905e \pm 04.3.30619969e \pm 00.6032148981e \pm 01.19.72768210e \pm 01.2.64017386e \pm 00.1.91933916e \pm 00.3130579e \pm 02.6.30827626e \pm 03.1.36179967e \pm 03.1.09199426e \pm 00.3130579e \pm 02.6.30827626e \pm 03.1.36179967e \pm 03.1.09199426e \pm 00.3130579e \pm 02.6.30827626e \pm 03.3130579e \pm 03.30827626e \pm 03.30827666e \pm 03.308276666e \pm 03.30827666e \pm 03.308276666e \pm 03.30827666e \pm 03.308276666e \pm 03.308276666e \pm 03.30827666
                                                                     10^{-5}
                                                                                    10^{-4}
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619967e+00,
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   [6.03130574e+02, 6.30827627e+03, 1.36179972e+03, 1.09199426e+00,
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619966e+00,
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                   [6.03130580e+02, 6.30827630e+03, 1.36179967e+03, 1.09199424e+00,
            epsilon Initial_guesses Converged
                                                                                                    1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                  618.047086 603.130574
                                                                                                    6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619969e+00
                                 16278.856600 6308.276322
                                                                                                    6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00]), array([0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.019827886, 0.019827886, 0.019827886, 0.019827886, 0.019827886, 0.019827886, 0
                                 1300.653790 1361.799653
                                                                                                   0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786,
                                   1.096541 1.091994
                                                                                                   0.01982786, 0.01982786, 0.01982786, 0.01982786, 0.01982786,
                               1916.175610 1916.175610
                                                                                                   0.01982786, 0.01982786]))
                              18874.240800 18874.240800
                                                                                                       fun: 0.01982785501807699
                                                         0.009030
                                                                                                   message: 'Optimization terminated successfully.'
                                                          0.820433
                                                                                                      nfev: 1231
                                 683.835638 683.835638
                                                                                                       nit: 771
                               32464.380200 32464.380200
                                                                                                    status: 0
                                                          0.000473
                                                                                                   success: True
                                                          3.306200
                                                                                                          x: array([6.03130574e+02, 6.30827632e+03, 1.36179965e+03, 1.09199423e+00,
                                                          0.632148
                                                                                                   1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                          0.972768
                                                                                                   6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.30619967e+00,
                                                          2.640174
                                                                                                   6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00])
```

inducer -> sensor (GFP output)

10-3

inducer -> S -| Output (GFP)

 $10^{-3}$ 

RSS (converged)=0.02

RSS (% reduction)=0.992

Across all four plots:

RSS (initial)=2.385

-14.916512

61.145863

-0.004547

0.000000

0.000000

0.000000

0.000000

0.000000

0.000000

0.000000

0.484848

0.000000

0.000000

0.000000

0.000000

B s -9970.580278

 $N_s$ 

Сr

Νr

Βh

C h

Fο

Во

Со

 $10^{-4}$ 

 $10^{-4}$ 

10-2

 $10^{-2}$ 

0.009030

0.820433

0.000473

2.821352

0.632148

0.972768

2.640174

1.919339

1.919339

 $10^{-1}$ 

 $10^{-1}$ 

 $10^{4}$ 

 $10^{4}$ 

 $10^{-5}$