```
final simplex: (array([[9.22687498e+02, 3.89560045e+03, 1.57027137e+03, 1.26078638e+00,
                                                                                                                                                               1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021566e+00,
                                                                                                                                                               6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                             [9.22687491e+02, 3.89560044e+03, 1.57027139e+03, 1.26078638e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021568e+00,
                                                                                                                                                               6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                             [9.22687498e+02, 3.89560048e+03, 1.57027134e+03, 1.26078639e+00, 1.260786969+00, 1.26078699+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 1.2607869+00, 
                                                                                                                                                               1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021567e+00,
                                                                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                             [9.22687500e+02, 3.89560045e+03, 1.57027130e+03, 1.26078635e+00,
                                                                                                                                                               1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021566e+00, \\ 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00], \\
                                                                                                                                                             [9.22687492e+02, 3.89560046e+03, 1.57027137e+03, 1.26078638e+00,
                                                                                                                                                               1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021566e+00,
                                                                                                                                                               6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                             [9.22687507e+02, 3.89560045e+03, 1.57027135e+03, 1.26078643e+00,
                                                                                                                                                              1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021566e+00,
                                                                                                                                                               6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                             [9.22687504e+02, 3.89560046e+03, 1.57027129e+03, 1.26078636e+00,
                                                                                                                                                               1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                       ['SM data type data plots for mutation', 'Sensor: 6.32148081e-01, 9.72768210e-01, Initial Guess 1.9760.5e-04, 1.91933916e+00, inducer ->S[9]9268749814981e-01, 9.72768210e-01, 9.7
           inducer -> sensor (GFP output)
                                                                                                                                                               6.83835638e+02, 3.2464380 e+0 Converged 5e-04, 3.01021565e+00, 6.32148081e-01, 9.72768210 e-01, Converged 5e-04, 3.01021565e+00, 1.91933916e+00], [9.22687496e+02, 3.8956004 e+0 Converged 5e+03, 1.26078634e+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, 3.01021566e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                     3 \times 10^{3}
                                                                                                                                                             [9.22<del>6875</del>04e+02, 3.89560044e+03, 1.57027143e+03, 1.26078641e+00,
                                                                                                                                                               1.91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021566e+00,
                                                                                                                                                               6.321<del>48081e 01, 9.</del>72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                               <del>9,22687509e+02,3.</del>89560042e+03,1.57027135e+03,1.26078641e+00,
1.91617<del>3</del>81e+03,1.88742408e+04,9.03017988e-03,8.20433340e-01,
                                                                   10-2
                                                                                                                     10<sup>-5</sup>
                           10^{-4}
                                               10<sup>-3</sup>
                                                                                                                                         10^{-4}
                                                                                                                                       inducer -> S -| Output (GFP)
                                                                                                                                                   • •[9.22687506e+02, 3.89560047e+03, 1.57027133e+03, 1.26078640e+00,
                                                                                                                                                              <del>1.91617561e+03, 1</del>.88742408e+04, 9.03017988e-03, 8.20433340e-01, 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021564e+00,
                                                                                                                                                               6.32148081e-01 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
10^{4}
                                                                                                     4 \times 10^{3}
                                                                                                                                                              [9.22687500e+02, 3.$9560047e+03, 1.57027128e+03, 1.26078636e+00,
                                                                                                                                                                  .91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6\83835638e+02, 3.\24643802e+04, 4.73376905e-04, 3.01021566e+00,
                                                                                                     3 \times 10^{3}
                                                                                                                                                               6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                             [9.22687496e+02, 3.89560045e+03, 1.57027142e+03, 1.26078643e+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 04.3.01021567e \pm 00.6032148981e \pm 01.19.72768210e \pm 01.2.64017386e \pm 00.1.91933916e \pm 0.1.91933916e \pm 0.1.9193916e \pm 0.1.919916e \pm 0.1.91
                                                                                       10^{-1}
                                                                                                                      10^{-5}
                                               10^{-3}
                                                                    10^{-2}
                                                                                                                                         10^{-4}
       10^{-5}
                           10^{-4}
                       Across all four plots:
                                                                                                                                                               1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021565e+00,
                           RSS (converged)=0.066
                                                                                                                                                               6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                             [9.22687494e+02, 3.89560052e+03, 1.57027128e+03, 1.26078638e+00,
                           RSS (initial)=4.103
                                                                                                                                                              1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021568e+00,
                           RSS (% reduction)=0.984
                                                                                                                                                               6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                             [9.22687493e+02, 3.89560050e+03, 1.57027131e+03, 1.26078633e+00,
                                          epsilon Initial_guesses Converged
                                                                                                                                                               1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                304.640412
                                                                         618.047086 922.687498
                                                                                                                                                               6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021566e+00
                      B s -12383.256145
                                                                         16278.856600 3895.600455
                                                                                                                                                               6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00]), array([0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644288, 0.0664488, 0.066488, 0.0664888, 0.0664888, 0.066488, 0.066488, 0.066888, 0.066888, 0.066888, 0.066888, 0.066888, 0.
                                                                       1300.653790 1570.271375
                                  269.617585
                                                                                                                                                             0.06644238, 0.06644238, 0.06644238, 0.06644238, 0.06644238,
                                                                         1.096541 1.260786
                      N_s
                                     0.164245
                                                                                                                                                             0.06644238, 0.06644238, 0.06644238, 0.06644238,
                                     0.000000
                                                                    1916.175610 1916.175610
                                                                                                                                                             0.06644238, 0.06644238]))
                                                                  18874.240800 18874.240800
                                     0.000000
                                                                                                                                                                   fun: 0.06644238405798533
                                                                         0.009030
                                     0.000000
                                                                                                       0.009030
                      C r
                                                                                                                                                             message: 'Optimization terminated successfully.'
                                                                         0.820433
                      Νr
                                     0.000000
                                                                                                       0.820433
                                                                                                                                                                 nfev: 1579
                                       0.000000
                                                                       683.835638
                                                                                                      683.835638
                                                                                                                                                                  nit: 1048
                                                                    32464.380200 32464.380200
                      Βh
                                       0.000000
                                                                                                                                                               status: 0
                                                                         0.000473
                                       0.000000
                                                                                                        0.000473
                      Ch
                                                                                                                                                             success: True
                                      0.188864
                                                                         2.821352
                                                                                                       3.010216
                      Fο
                                                                                                                                                                      x: array([9.22687498e+02, 3.89560045e+03, 1.57027137e+03, 1.26078638e+00,
                                       0.000000
                                                                         0.632148
                                                                                                       0.632148
                                                                                                                                                             1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                     B_o
                                       0.000000
                                                                         0.972768
                                                                                                       0.972768
                                                                                                                                                             6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.01021566e+00,
                                       0.000000
                                                                          2.640174
                                                                                                        2.640174
                                                                                                                                                             6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00])
                      Со
```

 10^{4}

 10^{3}

0.000000

1.919339

1.919339