```
final simplex: (array([[1.01224465e+03, 7.13108932e+03, 1.41103458e+03, 9.90117740e-01,
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588005e+00,
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.01224466e+03, 7.13108937e+03, 1.41103453e+03, 9.90117738e-01, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588006e+00,
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.01224466e+03, 7.13108933e+03, 1.41103456e+03, 9.90117741e-01,
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588006e+00,
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.01224466e+03, 7.13108937e+03, 1.41103455e+03, 9.90117736e-01,
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588006e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.01224466e+03, 7.13108936e+03, 1.41103456e+03, 9.90117743e-01,
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588006e+00,
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.01224466e+03, 7.13108937e+03, 1.41103453e+03, 9.90117736e-01,
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588005e+00,
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.01224466e+03, 7.13108937e+03, 1.41103455e+03, 9.90117734e-01,
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
         ['SM data type data plots for mutation', 'Sensor 6, 3,2148081e-01, 9,72768210 - 01, Initial Guess +00, 1.91933916e+00], cer -> sensor (GFP output) inducer -> S_{[1]} inducer 
inducer -> sensor (GFP output)
                                                                                                         6.83835638e+02, 3.2464380 e+0 Converged 5e-04, 3.03588006e+00, 6.32148081e-01, 9.72768210 e-01, Converged 5e+00, 1.91933916e+00], [1.01224466e+03, 7.1310893 e+0 Converged 5e+03, 9.90117738e-01,
                                                                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, 3.03588005e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                3 \times 10^{3}
                                                                                                        [1.01224465e+03, 7.13108938e+03, 1.41103452e+03, 9.90117727e-01,
                                                                                                         1.91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588006e+00,
                                                                                                         6.321<del>48081e 01, 9.</del>72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [<u>170]224466e+0377.</u>]3108931e+03, 1.41103458e+03, 9.90117747e-01, 
191617<del>5</del>61e+03, 9.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                        10-2
                                                                           10<sup>-5</sup>
                          10-3
           10^{-4}
                                                      10^{-1}
                                                                                         10^{-4}
                                                                                        Full circuft 83935 6789 602, 3.24643802e+04, 4.73376905e-04, 3.03588005e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
   inducer -> S -| Output (GFP)
                                                                6 \times 10^{3}
                                                                                                       [1.01224466e+03, 7.13108935e+03, 1.41103454e+03, 9.90117731e-01,
                                                                                                     ● 1.91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588006e+00,
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                4 \times 10^3
                                                                                                        [1.01224665e+03, 7.13108935e+03, 1.41103455e+03, 9.90117728e-01, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6\83835638e+02, 3.\24643802e+04, 4.73376905e-04, 3.03588006e+00,
                                                                3 \times 10^{3}
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.0]24466e+03, 7.13108937e+03, 1.41103454e+03, 9.90117731e-01,
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                        \begin{array}{l} 6.83835638e \pm 07.3.24643802e + 04, 4.73376905e - 04, 3.03588006e + 00, \\ 6.632148981e - 01, 19.72768210e - 01, 2.64017386e + 00, 1.91933916e + 00], \\ [1.01224466e + 03, 7.13108937e + 03, 1.41103455e + 03, 9.90117735e - 01, \\ \end{array}
                                        10^{-2}
                                                      10^{-1}
                                                                            10^{-5}
                                                                                          10^{-4}
           10^{-4}
                          10^{-3}
         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, 3.03588006e+00,
            RSS (converged)=0.027
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.01224466e+03, 7.13108937e+03, 1.41103453e+03, 9.90117739e-01,
           RSS (initial)=1.661
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588006e+00,
           RSS (% reduction)=0.984
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                        [1.01224466e+03, 7.13108934e+03, 1.41103456e+03, 9.90117749e-01,
                     epsilon Initial_guesses Converged
                                                                                                         1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
        A s 394.197568
                                           618.047086 1012.244654
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588006e+00
       B s -9147.767281
                                          16278.856600 7131.089319
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00]]), array([0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02752877, 0.0275277, 0.0275277, 0.0275277, 0.0275277, 0.0275277, 0.0275277, 0.0275277, 0.0275277, 0.0275277, 0
       C_s 110.380788
                                          1300.653790 1411.034578
                                                                                                        0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877,
       N_s
                                           1.096541 0.990118
                 -0.106424
                                                                                                        0.02732877, 0.02732877, 0.02732877, 0.02732877, 0.02732877,
                 0.000000
                                       1916.175610 1916.175610
                                                                                                        0.02732877, 0.02732877]))
                                      18874.240800 18874.240800
                 0.000000
                                                                                                            fun: 0.0273287707262191
                                          0.009030
                                                                0.009030
       C r
                 0.000000
                                                                                                        message: 'Optimization terminated successfully.'
                                          0.820433
       Νr
                 0.000000
                                                                 0.820433
                                                                                                           nfev: 1277
                  0.000000
                                         683.835638
                                                               683.835638
                                                                                                            nit: 785
                                       32464.380200 32464.380200
                  0.000000
       Βh
                                                                                                         status: 0
                                           0.000473
                  0.000000
                                                                 0.000473
       C h
                                                                                                        success: True
                  0.214528
                                           2.821352
                                                                 3.035880
       Fο
                                                                                                              x: array([1.01224465e+03, 7.13108932e+03, 1.41103458e+03, 9.90117740e-01,
                  0.000000
                                           0.632148
                                                                 0.632148
                                                                                                        1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
       Во
                  0.000000
                                           0.972768
                                                                 0.972768
                                                                                                        6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 3.03588005e+00,
                  0.000000
                                           2.640174
                                                                 2.640174
                                                                                                        6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00])
        Со
```

 10^{4}

 10^{3}

 10^{4}

 10^{-5}

0.000000

1.919339

1.919339