```
final simplex: (array([[8.68494472e+02, 6.07291389e+03, 1.72288709e+03, 1.10259592e+00,
                                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                  6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041454e+00,
                                                                                                                                                 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                [8.68494477e+02, 6.07291381e+03, 1.72288709e+03, 1.10259592e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041455e+00,
                                                                                                                                                 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                [8.68494467e+02, 6.07291389e+03, 1.72288701e+03, 1.10259588e+00,
                                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041456e+00,
                                                                                                                                                 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                [8.68494479e+02, 6.07291390e+03, 1.72288706e+03, 1.10259591e+00,
                                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041455e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
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                                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                  6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041456e+00,
                                                                                                                                                 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                [8.68494454e+02, 6.07291389e+03, 1.72288707e+03, 1.10259591e+00,
                                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                  6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041456e+00,
                                                                                                                                                 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                [8.68494458e+02, 6.07291380e+03, 1.72288716e+03, 1.10259590e+00,
                                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                      ['SM data type data plots for mutation', 'Sersor76]8e+02, 3.24643802e+0 Initial Guess 6-04, 2.95041455e+00, 6.32148081e-01, 9.72768210e-01, Initial Guess 6-04, 2.95041455e+00, 6.32148081e-01, 9.72768210e-01, Initial Guess 6-04, 2.95041455e+00], cer -> sensor (GFP output) inducer -> S[8|68494478844091, 6.0729137 ve+0 Converged 13e+03, 1.10259594e+00,
          inducer -> sensor (GFP output)
                                                                                                                                                  6.83835638e+02, 3.2464380 e+0 Converged 5e-04, 2.95041453e+00, 6.32148081e-01, 9.72768210 e-01, Converged 5e-04, 2.95041453e+00, 1.91933916e+00], [8.68494451e+02, 6.0729138 e+0 Converged 3e+03, 1.10259591e+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, 2.95041458e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                             3 \times 10^{3}
                                                                                                                                                [%.68494454e+02, 6.∮7291381e+03, 1.72288713e+03, 1.10259589e+00,
                                                                                                                                                 1.91617561e + 03, 1.88742408e + 04, 9.03017988e - 03, 8.20433340e - 01,
                                                                                                                                                  &83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041456e+00,
                                                                                                                                                 6.32148081e 01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                [<u>8.6</u>8494454e+02, <u>6.</u>07291395e+03, 1.72288701e+03, 1.10259587e+00, 1.91617581e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                             10-2
                                                                                                           10<sup>-5</sup>
                         10^{-4}
                                           10<sup>-3</sup>
                                                                                                                            inducer -> S -| Output (GFP)
                                                                                                                                            [8.68494450e+02, 6.07291394e+03, 1.72288701e+03, 1.10259586e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01, 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041453e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00], 8.68494444e+02, 6.07291385e+03, 1.72288714e+03, 1.10259592e+00, 8.68494444e+02, 6.07291385e+03, 1.72288714e+03, 1.0259592e+00, 8.6849444e+02, 6.07291385e+03, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 6.072913896, 
                                                                                             4 \times 10^{3}
10^{4}
                                                                                                                                                     ,91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041455e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                             3 \times 10^{3}
                                                                                                                                                [8.68494469e+02, 6.07291382e+03, 1.72288703e+03, 1.10259591e+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 04.2.95041455e \pm 00.6032148981e \pm 01.19.72768210e \pm 01.2.64017386e \pm 00.1.91933916e \pm 0.1.91933916e \pm 0.1.91933916e \pm 0.1.91933916e \pm 0.1.91933916e \pm 0.1.91933916e \pm 0.1.91933916e \pm 0.1.9193916e \pm 0.1.919916e \pm 0.1.919916
                                                                                10^{-1}
                                                                                                            10^{-5}
                                                              10^{-2}
                                                                                                                              10^{-4}
       10^{-5}
                         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, 2.95041454e+00,
                         RSS (converged)=0.057
                                                                                                                                                 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                [8.68494449e+02, 6.07291393e+03, 1.72288702e+03, 1.10259585e+00,
                         RSS (initial)=2.078
                                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                                 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041452e+00,
                         RSS (% reduction)=0.973
                                                                                                                                                 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                                                                [8.68494473e+02, 6.07291380e+03, 1.72288705e+03, 1.10259592e+00,
                                       epsilon Initial_guesses Converged
                                                                                                                                                  1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                   618.047086 868.494472
                              250.447386
                                                                                                                                                 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041453e+00
                    B s -10205.942715
                                                                   16278.856600 6072.913885
                                                                                                                                                 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00]), array([0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721
                                                                 1300.653790 1722.887092
                                422.233302
                                                                                                                                                0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981,
                                                                   1.096541 1.102596
                    N_s
                                  0.006055
                                                                                                                                                0.05721981, 0.05721981, 0.05721981, 0.05721981, 0.05721981,
                                  0.000000
                                                              1916.175610 1916.175610
                                                                                                                                                0.05721981, 0.05721981]))
                                                             18874.240800 18874.240800
                                  0.000000
                                                                                                                                                     fun: 0.057219814046328026
                                                                   0.009030
                                  0.000000
                                                                                              0.009030
                    C r
                                                                                                                                                message: 'Optimization terminated successfully.'
                                                                   0.820433
                    Νr
                                  0.000000
                                                                                              0.820433
                                                                                                                                                    nfev: 1316
                                    0.000000
                                                                 683.835638
                                                                                              683.835638
                                                                                                                                                     nit: 845
                                                              32464.380200 32464.380200
                    Βh
                                    0.000000
                                                                                                                                                 status: 0
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                                    0.000000
                                                                                               0.000473
                    C h
                                                                                                                                                success: True
                                   0.129063
                                                                   2.821352
                                                                                               2.950415
                    Fο
                                                                                                                                                        x: array([8.68494472e+02, 6.07291389e+03, 1.72288709e+03, 1.10259592e+00,
                                                                   0.632148
                                   0.000000
                                                                                               0.632148
                                                                                                                                                1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                   0.000000
                                                                   0.972768
                                                                                               0.972768
                    Во
                                                                                                                                                6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.95041454e+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