```
final simplex: (array([[6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                              4.30876058e+03, 5.45107153e+03, 9.81247804e-04, 2.09197580e+00,
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                              4.30876058e+03, 5.45107151e+03, 9.81247798e-04, 2.09197581e+00,
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                              4.30876058e+03, 5.45107152e+03, 9.81247801e-04, 2.09197581e+00,
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                              4.30876058e+03, 5.45107151e+03, 9.81247798e-04, 2.09197581e+00,
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                            [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00, 4.30876058e+03, 5.45107159e+03, 9.81247811e-04, 2.09197579e+00,
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                              4.30876058e+03, 5.45107152e+03, 9.81247802e-04, 2.09197582e+00,
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
     ['SM data type data plots for mutation', 'Regulatof1001+03, 5.45107150=+03 Initial Guess 9e-04, 2.09197581e+00, ducer -> sensor (GFP output) inducer -> \frac{6}{6} \frac{83835638}{2} \frac{83835638}{4} \frac{83835638}{2} \frac{83835638}{4} \frac{83835638}{2} \frac{83835638}{4} \frac{83835638}{2} \frac{83835638}{4} \frac{83835638}{2} \frac{83835638}{4} \frac{83835638}{2} \frac{83835638}{4} \frac{83835638}{
inducer -> sensor (GFP output)
                                                                                                             [6.18047086e+02, 1.6278856] Converged 7 9e+03, 1.09654125e+00,
                                                                                                              4.30876058e+03, 5.4510714 e+0 Converged 9 e-04, 2.09197582e+00, 6.83835638e+02, 3.2464380 e+0 Converged 5e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210 Converged +00, 1.91933916e+00],
                                                                    6 \times 10^{3}
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                              4.30876058e+03, 5.45107150e+03, 9.81247797e-04, 2.09197581e+00, 6.83835638e+02, 9.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                   4 \times 10^{3}
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                   3 \times 10^{3}
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                               4.30876058e+03, 5.45107155e+03, 9.81247805e-04, 2.09197580e+00,
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                             <u>_6.32148081e-01,9.7</u>2768210e-01,2.64017386e+00,1.91933916e+00],
[6.18047<del>0</del>86e+02,1.62788566e+04,1.30065379e+03,1.09654125e+00,
                                         10^{-2}
                                                                               10^{-5}
                                                        10^{-1}
                                                                                              10^{-4}
                                                                                            inducer -> S -| Output (GFP)
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                   4 \times 10^3
                                                                                                               6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                              1,30876058e+03,5.45107151e+03,9.81247799e-04,2.09197581e+00,6.83835638e+02,3.24643802e+04,4.73376905e-04,2.49663080e+00,
                                                                   3 \times 10^{3}
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                              6 18047<del>086e+02. 1</del>.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                   2 \times 10^{3}
                                                                                                               4.30876058e+03, 5.45107144e+03, 9.81247786e-04, 2.09197584e+00,
                                                                                                              6.83835038e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                             [6.18047086e+02, \Phi.62788566e+04, 1.30065379e+03, 1.09654125e+00, \Phi.62788566e+04, 0.0065379e+0.006669
                                                                                                              <u>4,30876058e</u>903,5.45107151e+03, 9.81247799e-04, 2.09197581e+00,
                                          10^{-2}
                                                                                              10^{-4}
                                                                                                              10^{-5}
                                                         10^{-1}
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00, 4.30876058e+03, 5.45107158e+03, 9.81247812e-04, 2.09197580e+00,
            RSS (converged)=0.111
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                              4.30876058e+03, 5.45107153e+03, 9.81247802e-04, 2.09197581e+00,
            RSS (% reduction)=0.933
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                                                                                              6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                       epsilon Initial guesses
                                                                    Converged
                                                                                                             [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                           618.047086 618.047086
                                                                                                              4.30876058e+03, 5.45107144e+03, 9.81247786e-04, 2.09197584e+00,
                                         16278.856600 16278.856600
                                                                                                              6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                          1300.653790 1300.653790
                                                                                                              6.32148081e-01,\,9.72768210e-01,\,2.64017386e+00,\,1.91933916e+00]]),\,array([0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.1114026,\,0.114026,\,0.114026,\,0.114026,\,0.114026,\,0.114026,\,0.114026,\,0.114026,\,0.114026,\,0.114026,\,0.114026,\,
                                              1.096541
                                                                    1.096541
                                                                                                             0.1114026, 0.1114026, 0.1114026, 0.1114026, 0.1114026, 0.1114026,
                                              1916.175610 4308.760580
                                                                                                             0.1114026, 0.1114026, 0.1114026, 0.1114026, 0.1114026]))
                                              18874.240800 5451.071532
                                                                                                                 fun: 0.11140259908213282
                                              0.009030
                                                                     0.000981
                                                                                                             message: 'Optimization terminated successfully.'
                                              0.820433
                                                                     2.091976
                                                                                                                nfev: 3286
                                             683.835638
                                                                     683.835638
                                                                                                                 nit: 2318
                                          32464.380200 32464.380200
                                                                                                              status: 0
                                              0.000473
                                                                     0.000473
                                                                                                             success: True
                                              2.821352
                                                                     2.496631
                                                                                                                    x: array([6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                             4.30876058e+03, 5.45107153e+03, 9.81247804e-04, 2.09197580e+00,
                                              0.632148
                                                                     0.632148
                                              0.972768
                                                                     0.972768
                                                                                                             6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 2.49663080e+00,
                                              2.640174
                                                                     2.640174
                                                                                                             6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00])
                                              1.919339
                                                                     1.919339
```

 10^{4}

 10^{3}

 10^{4}

 10^{3}

 10^{-5}

 10^{-4}

 10^{-4}

 10^{-3}

 10^{-3}

Across all four plots:

RSS (initial)=1.545

0.000000

0.000000

0.000000

0.000000

2392.584970

-0.008049

1.271542

0.000000

0.000000

0.000000

-0.324721

0.000000

0.000000

0.000000

0.000000

B r -13423.169268

Νr

Βh

Во

Со