```
1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                 7.27451732e+02, 2.72786648e+04, 3.47991576e-04, 2.87403390e+00,
                                                                                                                                2.20588661e-01, 1.25584438e+00, 2.92568936e+00, 2.08159626e+00],
                                                                                                                               [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                7.27451729e+02, 2.72786648e+04, 3.47991577e-04, 2.87403388e+00,
                                                                                                                                 2.20588660e-01, 1.25584438e+00, 2.92568936e+00, 2.08159625e+00],
                                                                                                                               [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                 7.27451731e+02, 2.72786648e+04, 3.47991576e-04, 2.87403389e+00,
                                                                                                                                2.20588662e-01, 1.25584438e+00, 2.92568936e+00, 2.08159626e+00],
                                                                                                                               [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                                                1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                7.27451730e+02, 2.72786648e+04, 3.47991575e-04, 2.87403389e+00, 2.20588666e-01, 1.25584437e+00, 2.92568936e+00, 2.08159626e+00],
                                                                                                                               [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                 7.27451727e+02, 2.72786648e+04, 3.47991576e-04, 2.87403388e+00,
                                                                                                                                 2.20588663e-01, 1.25584438e+00, 2.92568935e+00, 2.08159626e+00],
                                                                                                                                [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                 7.27451732e+02, 2.72786648e+04, 3.47991576e-04, 2.87403389e+00,
                                                                                                                                2.20588664e-01, 1.25584438e+00, 2.92568935e+00, 2.08159626e+00],
                                                                                                                               [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
               ['SM data type data plots for mutation', 'Output5/19e+02, 2.72786647 | Initial Guess +04, 2.87403389e+00, cer -> sensor (GFP output) inducer -> S_{[6]} = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.25584438 = 1.255
   inducer -> sensor (GFP output)
                                                                                                                                 7.27451731e+02, 2.72786648e+04Converged 76e-04, 2.87403389e+00,
                                                                                                                               2.20588661e-01, 1.25584438e+00, 2.00159626e+00], [6.18047086e+02, 1.6278856e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0.4.25e+0
                                                                                4 \times 10^3
                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                7.27451728e+02, 2.72786648e+04, 3.47991576e-04, 2.87403388e+00, 2.20588661e-01, 1.25584438e+00, 2.92568936e+00, 2.08159626e+00], 1.8047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01, 7.27451726e+02, 2.72786648e+04, 3.47991577e-04, 2.87403387e+00, 2.08588663e-01, 2.72786648e+04, 3.47991577e-04, 2.87403387e+00, 2.08588664e-04, 2.87403387e+00, 2.08588664e-04, 3.47991577e-04, 2.87403387e-04, 2.874038664e-04, 3.47991576e-04, 2.8740386e-04, 2.874086e-04, 2.874086e-04, 2.874086e-04, 2.874086e-04, 2.874086e-04, 2.874086e-04, 2.874086e
                                                                                3 \times 10^{3}
                                                                                2 \times 10^{3}
                                                                                                                                 2.20588662e-01, 1.25584439e+00, 2.92568936e+00, 2.08159625e+00],
                                                                                                                                <del>[6<u>1</u>804708<u>6</u>e+02<u>1</u>1.6</del>2788566e+04, 1.30065379e+03, 1.09654125e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                   10-2
                                                                                             10^{-5}
                                  10-3
                 10^{-4}
                                                                   10^{-1}
                                                                                                               10^{-4}
                                                                                                            Full circult 2/15/15/15/15/16/102, 2.72786648e+04, 3.47991576e-04, 2.87403389e+00,
       inducer -> S -| Output (GFP)
                                                                                                                                          <del>5886616-01, 1.2</del>5584438e+00, 2.92568936e+00, 2.08159626e+00],
                                                                                                                             ●[6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                                                 1.91617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                4 \times 10^3
                                                                                                                                  7.27451730e+02, 2.72786648e+04, 3.47991576e-04, 2.87403389e+00,
                                                                                                                                  📭 20588664e-01, 1.2 | 5584438e+00, 2.92568935e+00, 2.08159626e+00],
                                                                                                                                [618047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                3 \times 10^{3}
                                                                                                                                 1.93617561e+03, 1.$8742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                           51732e+02, 2.72786648e+04, 3.47991577e-04, 2.87403389e+00,
                                                                                                                                 2.2058862e-01, 1.25584438e+00, 2.92568936e+00, 2.08159626e+00],
                                                                                 2 \times 10^{3}
                                                                                                                               [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01, 7.27451737e+02, 2.72786648e+04, 3.47991577e-04, 2.87403391e+00,
                                                                                                                                \frac{20}{20}20588655e-01,\frac{1}{10}25584439e+00, 2.92568936e+00, 2.08159626e+00], [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
10^{-5}
                 10^{-4}
                                  10<sup>-3</sup>
                                                   10^{-2}
                                                                    10^{-1}
                                                                                              10^{-5}
                                                                                                               10^{-4}
              Across all four plots:
                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                                 7.27451727e+02, 2.72786648e+04, 3.47991576e-04, 2.87403388e+00,
                 RSS (converged)=0.078
                                                                                                                                 2.20588661e-01, 1.25584439e+00, 2.92568936e+00, 2.08159626e+00],
                                                                                                                                [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00, 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                 RSS (initial)=0.17
                                                                                                                                7.27451728e+02, 2.72786648e+04, 3.47991577e-04, 2.87403388e+00,
                 RSS (% reduction)=0.686
                                                                                                                                2.20588664e-01, 1.25584438e+00, 2.92568935e+00, 2.08159625e+00],
                                                                                                                                [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                            epsilon Initial guesses
                                                                               Converged
                                                                                                                                 1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                         0.000000
                                                    618.047086 618.047086
                                                                                                                                 7.27451726e+02, 2.72786648e+04, 3.47991577e-04, 2.87403387e+00
            Вs
                         0.000000
                                                  16278.856600 16278.856600
                                                                                                                                0.000000
                                                  1300.653790 1300.653790
                                                                                                                               0.07762093, 0.07762093, 0.07762093, 0.07762093, 0.07762093,
                        0.000000
                                                      1.096541
                                                                                1.096541
                                                                                                                               0.07762093, 0.07762093, 0.07762093, 0.07762093, 0.07762093,
                        0.000000
                                                  1916.175610 1916.175610
                                                                                                                               0.07762093, 0.07762093]))
                                                 18874.240800 18874.240800
                        0.000000
                                                                                                                                    fun: 0.07762093138095393
                        0.000000
                                                      0.009030
                                                                                0.009030
                                                                                                                                message: 'Optimization terminated successfully.'
                                                                                 0.820433
            Νr
                        0.000000
                                                      0.820433
                                                                                                                                   nfev: 1871
                                                      683.835638 727.451732
                        43.616094
                                                                                                                                    nit: 1276
                                                      32464.380200 27278.664793
            B h -5185.715407
                                                                                                                                 status: 0
                                                       0.000473
                        -0.000125
                                                                                 0.000348
            C h
                                                                                                                               success: True
                        0.052682
                                                      2.821352
                                                                                 2.874034
            Fο
                                                                                                                                       x: array([6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                 0.220589
                        -0.411559
                                                       0.632148
            Αо
                                                                                                                               1.91617561e+03, 1.88742408e+04, 9.03017988e-03, 8.20433340e-01,
                                                                                                                               7.27451732e+02, 2.72786648e+04, 3.47991576e-04, 2.87403390e+00,
                         0.283076
                                                       0.972768
                                                                                 1.255844
            Во
                         0.285515
                                                       2.640174
                                                                                 2.925689
                                                                                                                               2.20588661e-01, 1.25584438e+00, 2.92568936e+00, 2.08159626e+00])
            Со
            Νo
                         0.162257
                                                       1.919339
                                                                                 2.081596
```

 10^{4}

 10^{3}

 10^{4}

 10^{3}