Set up:

param\_struct = ...

    {'beta\_h', 0.24;

     'beta\_v', 0.24;

     'gamma\_h', 1/6;

     'mu\_h', 1/(70\*365);

     'nu\_h', 1/3;

     'psi\_v', 0.3;

     'mu\_v', 1/17;

     'nu\_v', 1/11;

     'sigma\_h1', 10; %low risk contacts

     'sigma\_h2', 30; %high risk contacts

     'sigma\_v', 0.5;

     'H0', 100;

     'theta1', 1-param(1); %proportion of population in group 1 - low risk

     'theta2', param(1);% proportion of population in group 2 - high risk

     'theta0', .8; % no risk group

     'init\_cumulative\_infected', param(4);

     'K\_v' , param(5);

     'pi1', param(2); %proportion that continues to be bitten in infected group 1

     'pi2', param(3); %proportion that continues to be bitten in infected group 2

    }';

params = struct(param\_struct{:});

init =  ...

    [param.H0 \*param.theta1 - param.init\_cumulative\_infected\*param.theta1,

     param.H0\* param.theta2 - param.init\_cumulative\_infected\*param.theta2,

     param.init\_cumulative\_infected \* param.theta1,

     param.init\_cumulative\_infected \* param.theta2,

     0,

     0,

     param.init\_cumulative\_infected \* param.theta1,

     param.init\_cumulative\_infected \* param.theta2,

     param.K\_v\*0.75,

     0,

     0];

str.psol=[0.7,0.6,.8,4,1000]'; % initial guess at the solution for the parameters

str.ub = [1,.8, .9,10,1500]';

str.lb = [0.1,0.2, 0.3,1,800]';

str.noise\_sd=0.05;

The pfit solution values are

pfit =

7.8873e-01

8.0000e-01

6.1626e-01

3.4741e+00

1.2090e+03

BEGIN RESIDUAL ANALYSIS TESTS

Gaussian process models about the data fit should satisfy the conditions

residual mean = -0.011582 approx 0.14299 = residual median

residual STD = 4.5285 approx 3.5953 = residual MAD

Randomness test that the ratio of positive to negative res1d = 0.52475 is close to 0.5

No residual trend indicated if the trend threshold = 95 > 0 = autocorrelation

BEGIN BOOTSTRAP ANALYSIS

mean pfit 95% CI delta

7.8745e-01 2.3221e-02

5.7976e-01 1.2551e-01

6.9298e-01 7.8335e-02

3.6034e+00 8.7776e-02

1.1337e+03 1.4298e+02

Correlation coefficients

1.0000e+00 -7.3653e-01 -6.6653e-01 -9.7953e-02 4.8941e-01

-7.3653e-01 1.0000e+00 3.8368e-01 1.1759e-01 -2.5115e-01

-6.6653e-01 3.8368e-01 1.0000e+00 -1.9880e-01 -9.6904e-01

-9.7953e-02 1.1759e-01 -1.9880e-01 1.0000e+00 2.4799e-01

4.8941e-01 -2.5115e-01 -9.6904e-01 2.4799e-01 1.0000e+00