```
%Initial Conditions:
S_0 = 1000; % Susceptible
I_0=1; % Infected
R_0=0; % Recovered
N = S_0+ I_0 + R_0;
b=100; % birth rate into susceptible
D=0.1; % death rate (independent of disease)

detTime = 50;
endTime = 150;
T1 = 0:detTime;
T2 = detTime:endTime;

nu=0.2; % Recovery rate
beta=0.0004; % Transmission rate
```

0:500 - pre MDT: burn-in

```
det=0;

[t, class]=ode45(@(t, class) simpModDet(t, class, N, beta, nu, b, D,
 det), T1,[S_0 I_0 R_0]);
S=class(:,1);
I=class(:,2);
R=class(:,3);
```

50:150 - post MDT: after burn-in

```
DetVec=[1, 0.5, 0.11, 0.09, 0.009, 0.0009,0.0001, 0];
Names=string(DetVec);
n = length(DetVec);
figure
for i = 1:n
    det = DetVec(i);
    sigma=0.5;
    deltaI=0.2;
    [t, class2]=ode45(@(t, class) simpModDet(t, class, N, beta, nu, b,
 D, det), T2, class(size(class,1),:) );
    S=class2(:,1);
    I=class2(:,2);
    R=class2(:,3);

    subplot(0.5*n,2,i)
    p1=plot(t,S,'g','LineWidth',2); hold on
    p2=plot(t,I,'r','LineWidth',2); hold on
    p3=plot(t,R,'b','LineWidth',2); hold on
    %axis([0 150 0 3000])
    ylabel('Incidence')
    title(sprintf('$d_{k}= %s
$',Names{i}),'Interpreter','latex', 'FontSize', 12, 'FontName', 'Times
 New Roman');
```

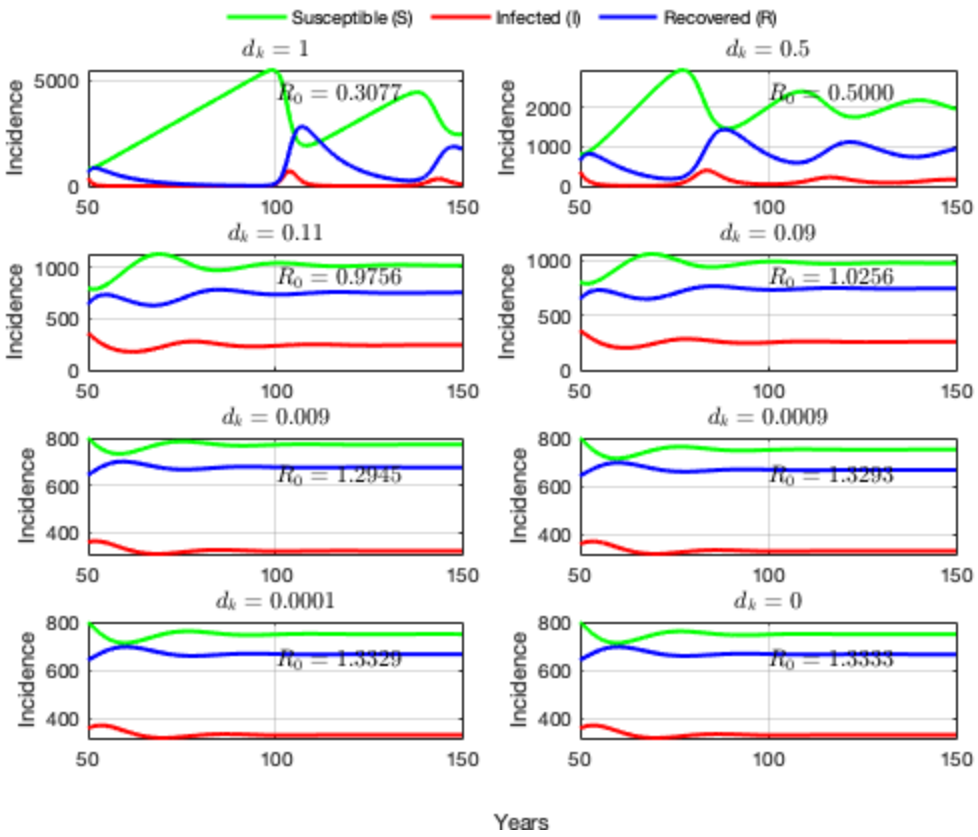
```
    R_nought=(beta*b)/(D*(D + nu + det));
    text(100,max(S)*0.8,sprintf('$R_{0}= %.4f
$',R_nought),'Interpreter','latex', 'FontSize', 12, 'FontName', 'Times
 New Roman')
    grid on
end
suplabel('Years')
hL = legend([p1,p2,p3],{'Susceptible (S)', 'Infected (I)','Recovered
 (R)'}, 'Orientation', 'horizontal');
newPosition = [0.4 0.87 0.2 0.2];
newUnits = 'normalized';
set(hL,'Position', newPosition,'Units',
 newUnits, 'color','none','Box','off');


ans =

  Axes (suplabel) with properties:

            XLim: [0 1]
            YLim: [0 1]
          XScale: 'linear'
          YScale: 'linear'
    GridLineStyle: '-'
         Position: [0.0900 0.0700 0.8550 0.8950]
            Units: 'normalized'

  Use GET to show all properties
```




```
DetVec=[1, 0.5, 0.11, 0.09, 0.009, 0.0009,0.0001, 0];
Names=string(DetVec);
n = length(DetVec);
figure
for i = 1:n
    det = DetVec(i);
    sigma=0.5;
    deltaI=0.2;
    [t, class2]=ode45(@(t, class) simpModDet(t, class, N, beta, nu, b,
 D, det), T2, class(size(class,1),:) );
    S=class2(:,1);
    I=class2(:,2);
    R=class2(:,3);

    %p1=plot(t,S,'g','LineWidth',2); hold on
    p2=plot(t,I,'r','LineWidth',2); hold on
    %p3=plot(t,R,'b','LineWidth',2); hold on
    %axis([0 150 0 3000])
    ylabel('Incidence')
    grid on
end
suplabel('Years')
hL = legend([p1,p2,p3],{'Susceptible (S)', 'Infected (I)','Recovered
 (R)'}, 'Orientation', 'horizontal');
newPosition = [0.4 0.87 0.2 0.2];
newUnits = 'normalized';
```

```
set(hL,'Position', newPosition,'Units',
 newUnits, 'color','none','Box','off');
```

```
ans =

  Axes (suplabel) with properties:

            XLim: [0 1]
            YLim: [0 1]
          XScale: 'linear'
          YScale: 'linear'
    GridLineStyle: '-'
         Position: [0.0900 0.0700 0.8550 0.8950]
            Units: 'normalized'

  Use GET to show all properties
```

DetVec = [0, 0.09, 0.11, 1]; n = length(DetVec); figure for i = 1:n det = DetVec(i); sigma=0.5; deltaI=0.2; [t, class2]=ode45(@(t, class) simpModDet(t, class, N, beta, nu, b, D, det), T2, class(size(class,1),:)); S=class2(:,1); I=class2(:,2); R=class2(:,3);

```
            subplot(n,1,i)
            plot(t,S,'g','LineWidth',2); hold on
            plot(t,I,'r','LineWidth',2); hold on
            plot(t,R,'b','LineWidth',2); hold on
            %axis([0 50 0 500])
            ylabel('Incidence')
            h=legend('Susceptible (S)', 'Infected (I)','Recovered (R)','Location','
        end
        xlabel('Years')
```

Published with MATLAB® R2018b