
```

function singlecell_nonoise
% % sol = dde23(ddefun,lags,history,tspan,options)
% % Specify history in one of three ways:
% %     A function of such that y = history(t) returns the solution for as a co
% %     A constant column vector, if is constant
% %     The solution sol from a previous integration, if this call continues that

close all;
clear all;
clc;

% -----
% ----- CONSTANTS -----
% -----
% Molecules (RR):           Attenuation (MM):
% 1: her1                   1: normal
% 2: her7                   2: 1/10th of normal
%                           3: 1/20th of normal

bPrintOnFile = 0;           % 0 = false, 1 = true
RR = 1;                     % which molecule?
MM = 2;                     % which a value do we check?

aa = [4.5, 0.45, 0.225];    % ammount of attunation

herr = {'her1','her7'};
a=aa(MM);
att={'normal','one 10th','one 20th'};
strFilePath = ['C:\\SYSBIO\\fig3N_',herr{RR},'_normal_',att{MM}];

tfinal = 1000;              % dde23, tspan:tfinal
tpher7 = 1.7;               % Tp for HER7
tmher7 = 7.1;               % 5.9<Tm<20.1 for HER7
tpher1 = 2.8;               % Tp for HER1
tmher1 = 12;                % 10.2<Tm<31.5 for HER1

if RR==1
    TP=tpher1;
    TM=tmher1;
else
    TP=tpher7;
    TM=tmher7;
end

func = @(t,x,Z)ddefun(t,x,Z,a);
sol = dde23(func,[TP, TM],@dde23hist,[0, tfinal]);

if (bPrintOnFile)
    figure('Visible','off')
else
    figure
end

tint = linspace(0,tfinal,5000);

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yint = deval(sol,tint);

[AX,H1,H2] = plotyy(tint,yint(1,:),tint,yint(2,:), 'plot');
title([herr{RR}, ', with ', att{MM}, ' rate protein synthesis'])
set(get(AX(1), 'Ylabel'), 'String', 'Protein')
set(get(AX(2), 'Ylabel'), 'String', 'mRNA')
set(AX(1), 'ylim', [0 1200], 'YTick', 0:400:1200)
set(AX(2), 'ylim', [0 120], 'YTick', 0:40:120)
set(AX, 'XTick', 0:200:1000, 'XTickLabel', {'0', '200', '400', '600', '800', 'time (min)'});
set(gcf, 'Units', 'centimeters');
afFigurePosition = [5 5 20 6];
set(gcf, 'Position', afFigurePosition);
set(gcf, 'PaperPositionMode', 'auto');
set(gca, 'Units', 'normalized', 'Position', [0.15 0.2 0.75 0.7]);

if (bPrintOnFile)
    print('-dpng', '-loose', sprintf('-r%d', 300), strcat(strFilePath, '.png'));
end

% -----
function s = dde23hist(t)
% Constant history function for dde23.
s = zeros(2,1);

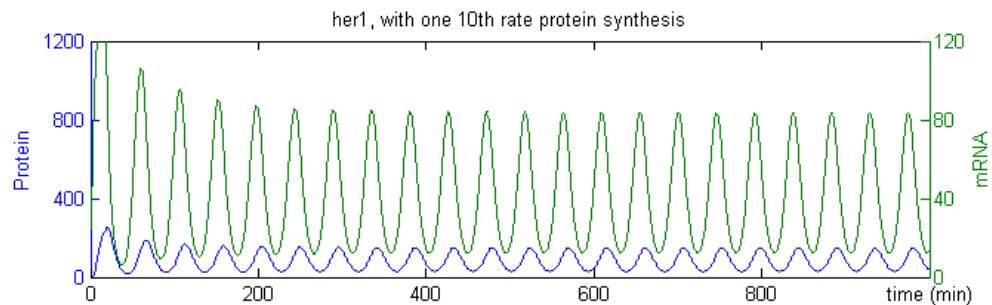
%-----
function dydt = ddefun(t,y,Z,a)
% t = time
% y(1)=p, y(2)=m
% z(1)=Tp, z(2)=Tm

ylag1 = Z(:,1);
ylag2 = Z(:,2);

% specify the constants
b=0.23;
c=0.23;
k=33;
p0=40;

dydt = [ a*ylag1(2) - b*y(1);
         k/(1+ylag2(1)^2/p0^2) - c*y(2)];

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