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% Supplementary File S4 For "SNAIL driven by a Feed Forward Loop Motif
Promotes TGFβ Induced Epithelial to Mesenchymal Transition"


function [t,z] = call_hillf()
tspan = 0:0.1:100;

z0 = [0,0,0];

a = 0.02;
b = 0.02;
k1 =1;
km1 =0.1;
k2 = 1;
km2 =0.5;
k3 = 0.9;
km3 = 0.1;
kd1 =0.3;
kd2 = 1;
kd3 =  1;
n=2;


function fa = s1(t)
if (t>=2 && t<=30) %|| (t >= 26)% && t <= 8.5) || (t >= 12 && t <=
13.5) || (t >= 17 && t <= 18.5)  || (t >= 25 && t<=45)
    fa = 1;
else
    fa = 0;

end
end

function fb = s2(t)
if (t>=2 && t<=30) %|| (t >= 20 && t<=26)
    fb = 1;
else
    fb = 0;

end
end

figure(1);

subplot(4,1,1)
fplot(@(t) s1(t),'k','LineWidth',1.2);hold on
xlim([0 60])
ylim([0 1.5])
ylabel('Sx','FontSize',12,'FontName','Times New Roman')
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subplot(4,1,2)
fplot(@(t) s2(t),'k','LineWidth',1.2);hold on
xlim([0 60])
ylim([0 1.5])
ylabel('Sy','FontSize',12,'FontName','Times New Roman')

subplot(4,1,3)
[t,z] = ode23s(@hillf,tspan,z0);
plot(t,z(:,2), 'k' ,'LineWidth',1.2);hold on;
%xlabel('Time,(A.U)','FontSize',12,'FontName','Times New Roman')
ylabel('[MDM2],(A.U)','FontSize',12,'FontName','Times New Roman')
xlim([0 60])

subplot(4,1,4)
[t,z] = ode23s(@hillf,tspan,z0);
plot(t,z(:,3),'k', 'LineWidth',1.2);hold on;
xlabel('Time,(A.U)','FontSize',12,'FontName','Times New Roman')
ylabel('[SNAIL],(A.U)','FontSize',12,'FontName','Times New Roman')
xlim([0 60])


function f = hillf(t,z)

f(1) = a*s1(t) - kd1*z(1);
f(2) = b*s2(t) + (k1*z(1)^n)/(km1^n + z(1)^n) - kd2*z(2);
f(3) = ((k2*z(2)^n)/(km2^n + z(2)^n)) * ((k3*(z(1)^n)/(km3^n +
z(1)^n))) - kd3*z(3); % AND

end

end
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