% nlin_fit_kinetics_tdot.m

%
% This MATLAB m-file returns the time
% derivatives of each concentration
% for the 2-reaction network :
%   A + B --> C
%   C + B --> D
%
% K. Beers
% 12/10/2001

function xdot = nlin_fit_kinetics_tdot(t,x,theta);

% First, extract the rate constants from the
% parameter vector.
k1 = theta(1);
k2 = theta(2);

% Next, extract the concentrations from the state vector.
A = x(1);
B = x(2);
C = x(3);
D = x(4);

% Calculate the rates of each reaction.
rate_1 = k1*A*B;
rate_2 = k2*C*B;

% Then, calculate the vector of time derivatives.
xdot = zeros(4,1);
xdot(1) = -rate_1;
xdot(2) = -rate_1 - rate_2;
xdot(3) = rate_1 - rate_2;
xdot(4) = rate_2;

return;