N = 10;

S = 1000; % kg/h

W = 2000; % kg/h

Xin = 0.05;

Yin = 0;

K = 10;

A = zeros(N);

B = zeros([N,1]);

% Fisrt stage

A(1, 1) = -(1+K\*S/W);

A(1, 2) = K\*S/W;

B(1, 1) = -Xin;

A\_entering = Xin \* W;

% Middle Stages

for i=2:N-1

A(i, i-1) = 1;

A(i, i) = -(1+K\*S/W);

A(i, i+1) = K\*S/W;

end

% Last stage

A(N, N-1) = 1;

A(N, N) = -(1+K\*S/W);

B(N, 1) = -(S/W)\*Yin;

x = A\B;

y = K.\*x;

A\_recovered = y(1) \* S;

fprintf('Percent of A recovered = %3.10f', A\_recovered / A\_entering \* 100)

Percent of A recovered = 99.9999918080

% all have units of 1/s

kab = 0.1;

kba = 0.02;

kbc = 0.5;

kcb = 0.1;

kcd = 0.01;

kdc = 0.1;

kda = 0.05;

kad = 0.2;

kbd = 0.3;

kdb = 0.1;

A = [-kab-kad, kba, 0, kda;...

kab, -kba-kbc-kbd, kcb, kdb;...

0, kbc, -kcb-kcd, kdc;...

kad, kbd, kcd, -kda-kdc-kdb;...

1, 1, 1, 1];

B = [0; 0; 0; 0; 1];

x = A\B;

fprintf('Species Concentrations (gmol/Liter) \n')

fprintf('A: %f \n', x(1))

fprintf('B: %f \n', x(2))

fprintf('C: %f \n', x(3))

fprintf('D: %f \n', x(4))

Species Concentrations (gmol/Liter)

A: 0.038559

B: 0.108696

C: 0.664868

D: 0.187877