r0 = [0.12; 0.1]; % population reproduction rates, per hour

at = 0.05; % avg. consumption values (fmole per cell); alpha\_ij: population i, resource j

bt = 0.1; % avg. production rates (fmole per cell per hour); beta\_ij: population i, resource j

rint = [0; 0.05]; % Nc\*Nm matrix of interaction coefficients

CSD = 1e5; % total initial cells

K = 1e1; % Michaelis-Menten coefficient, fmole/ml

ExtTh = 0.1; % population extinction threshold

DilTh = 1e8; % coculture dilution threshold

tau0 = 0;

tauf = 250; % in hours

dtau = 0.01; % in hours, cell growth update and uptake timescale

Ng = 50; % number of generations for preconditioning (before fitting)

[Nc Nm] = size(rint);

KMM = K\*[1 1]; % Michaelis-Menten coefficients for consumption and influence, fmole/ml

rp0 = 1/Nc\*ones(1,Nc);

%% Connectivity, Nm\*Nc

R = [0 1]; % release

P = [1 0]; % consumption

% interaction matrix

alpha = at\*[0 1]; % consumption rates

beta = bt\*[1 0]; % mediator release rates

A = (R.\*alpha)';

B = (P.\*beta)';

%% Estimation based on initially equal ratios

rp = [0.5 0.5]; % population fractions

%% Tested based on two different ratios

rpo1 = [0.5 0.5]; % population fractions

rpo2 = [0.9591 0.0409]; % population fractions