

Sample Matlab code for laboratory exercises two-power network control

```
function F = decentralPI(A,B,C,D)
clc
s = tf('s');

% RGA analysis is done. Input one is paired with output one, input two is paired with output two.

sys=ss(A,B,C,D);           % Creating the state-space model
G = zpk(sys);              % Creating the frequency-space model
g11 = G(1,1);              % Transfer function from input one to output one
g22 = G(2,2);              % Transfer function from input two to output two

w_d = 0.1;                 % Cross-over frequency

[mag,phase] = bode(g11,w_d); % Phase and magnitude of g11 at frequency w_d
T = -1/(w_d*tan(pi/3-pi-phase/180*pi)); % Time constant
[mag2,phase2] = bode(1+1/(T*s),w_d); % Magnitude and phase of the integrator
K = 1/(mag*mag2);          % Proportional gain
F_11 = K*(1+1/(T*s));      % PI controller for pairing input-one-output-one

% The same procedure will be repeated for the pairing input-two-output-two

[mag,phase] = bode(g22,w_d);
T = -1/(w_d*tan(pi/3-pi-phase/180*pi));
[mag2,phase2] = bode(1+1/(T*s),w_d);
K = 1/(mag*mag2);
F_22 = K*(1+1/(T*s));

F = [F_11 0 ;0 F_22];    % Overall controller
end
```