

```
function pidsearch_calibration(G,type)
switch(type)
    %% Using pidtuner to generate a PI controller
    case 'PI';
        % Using pidtuner to generate a PI controller
        C_pi = pidtune(G, 'PI');

        % Using pidsearch to generate a calibrate version of PI controller
        C_pi = pidsearch(G,C_pi,'OS')

        % Baseline controller effort and system transfer functions
        % Baseline System Transfer Function
        T_pi = (C_pi*G)/(1+(G*C_pi));

        %% Plot the Baseline vs. tuned system Step Response
        figure(3);
        hold on;
        subplot(1,2,1);

        step(T_pi)
        grid on;

        legend('Baseline');
        title('System Step Response of PI Contoller');
        hold off;

        % Plot the Baseline vs. tuned system Contoller Effort Step Response

        Tu = T_pi/G;
        subplot(1,2,2);
        step(Tu)
        grid on;

        legend('Baseline');
        title('Contoller Effort Step Response of PI');
        hold off;

    %% Using pidtuner to generate a PIDF controller
    case 'PIDF'

        % Using pidtuner to generate a PIDF controller
        C_pidf = pidtune(G, 'PIDF');

        % Using pidsearch to generate a calibrate version of PI controller
        C_pidf = pidsearch(G,C_pidf,'OS')

        % Baseline controller effort and system transfer functions
        % Baseline System Transfer Function
        T_pidf = (C_pidf*G)/(1+(G*C_pidf));

        %% Plot the Baseline vs. tuned system Step Response
```

```
figure(4);
hold on;
subplot(1,2,1);

step(T_pidf)
grid on;

legend('Baseline');
title('System Step Response of PIDF Controller');

% Plot the Baseline vs. tuned system Controller Effort Step Response
hold on;
subplot(1,2,2);

Tu = T_pidf/G;
step(Tu)
grid on;

legend('Baseline');
title('Controller Effort Step Response of PIDF');
hold off;

%% Using pidtuner to generate a PDF controller
case 'PDF';

% Using pidtuner to generate a PDF controller
C_pdf = pidtune(G, 'PDF');

% Using pidsearch to generate a calibrate version of PDF controller
C_pdf = pidsearch(G,C_pdf,'OS')

% Baseline controller effort and system transfer functions
% Baseline System Transfer Function
T_pdf = (C_pdf*G)/(1+(G*C_pdf));

%% Plot the Baseline vs. tuned system Step Response
figure(6);
hold on;
subplot(1,2,1);

step(T_pdf)
grid on;

legend('Baseline');
title('System Step Response of PDF Controller');
hold off;

% Plot the Baseline vs. tuned system Controller Effort Step Response
hold on;
subplot(1,2,2);
```

```
Tu = T_pdf/G;  
step(Tu)  
grid on;  
  
legend('Baseline');  
title('Contoller Effort Step Response of PDF');  
hold off;  
end
```