```
% Authors ~
    % Suyash Sardar

% Function Calculates the following ~
    % 1.Pressure Distribution across thetha and radius
    % 2.Load Carrying Capacity of the bearing

% Inputs ~
    %[n ~ Attitude Ratio]
    %[x_nodes ~ Number of Nodes in X direction]
    %[z_nodes ~ Number of Nodes in Z direction]
    %[L_B ~ Length to Width Ratio]

% Outputs ~
    %[ h_bar ~ Height at various nodes]
    %[ p_bar ~ Pressure at various nodes]
    %[ Load_capacity ~ Load carrying capacity of the bearing]

% Trial run for function
% [h_bar,p_bar,Load_capacity] = two_de_polar(2,20,20,1);

function [h_bar,p_bar,Load_capacity] =
 two_de_polar(n,thetha_nodes,r_nodes,L_B)

flag =0;
iter =0;
thetha_t = 60 * (pi/180);

B_L = 1/ L_B;
dthetha  = 1/ (thetha_nodes-1);
dr  = 1/ (r_nodes-1);

% Creating Mesh
thetha=0:dthetha:1;
r=0:dr:1;
[Thetha,R] = meshgrid(thetha,r);


p_bar = zeros(thetha_nodes,r_nodes);
%h_bar = n + n * (1 - Thetha);
h_bar = n - (n-1) * Thetha;

while flag ~=1

    p_bar_prev=p_bar;
    iter = iter + 1;

    for i=2:r_nodes-1
        for j=2:thetha_nodes-1

            % Updating Pressure Matrix
```

```
            A=((-1.5 * (1-n) / h_bar(i,j) * R(i,j)^2 * thetha_t^2) *
 (p_bar(i+1,j)-p_bar(i-1,j))) / dthetha;
            B=(1/ (R(i,j)^2 * thetha_t^2) * (p_bar(i+1,j) +
 p_bar(i-1,j)) / (dthetha^2));
            C=(p_bar(i,j+1) - p_bar(i,j-1)) / (2 * dr * R(i,j));
            D=(p_bar(i,j+1) + p_bar(i,j-1)) / (dr^2);
            E=((n-1)/ (h_bar(i,j)^3));
            F=2*((1/(dthetha^2 * R(i,j)^2 * thetha_t^2))+((1/dr^2)));
            p_bar(i,j)=(A+B+D+E)/F;
            p_bar(i,j)=p_bar_prev(i,j)+(p_bar(i,j)-
p_bar_prev(i,j))*0.9;

        end
    end

    % Checking For Convergence
    convergence= (sum(sum(p_bar - p_bar_prev))/sum(sum(p_bar)));
    sprintf("iter: %d conv: %f",iter, convergence)
    if convergence<=1e-4
             flag=1;
    end

    % Plotting  pressure distribution
  drawnow
  surf(Thetha,R,p_bar);
  title([ 'PRESSURE DISTRIBUTION' '     ' 'for' '     ''Attitude
 Ratio:' '     ' num2str(n)])
  xlabel('Non-dimentional Thetha');
  ylabel('Non-dimentional Radius');
  zlabel('Non-dimentional Pressure');


  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%

  % Calculating Load Carrying Capacity

  % Trapezoidal 2D Rule

  % Four Corner Points of the Meshgrid
  Load_capacity = (p_bar(1,1) + p_bar(thetha_nodes,1) +
 p_bar(1,r_nodes) + p_bar(thetha_nodes,r_nodes)) ...
      * (dthetha * dr) / 4 ;

  % Four Sides Except Corner Points of the Meshgrid
  Load_capacity = Load_capacity + (sum(p_bar(2:thetha_nodes-1,1)) +
 sum(p_bar(2:thetha_nodes-1,r_nodes))...
      + sum(p_bar(1,2:r_nodes-1)) +
 sum(p_bar(thetha_nodes,2:r_nodes-1))) * (dthetha * dr / 2) ;

  % Central Points (i.e : All points except the 4 sides of the
 Meshgrid)
  Load_capacity = Load_capacity + (sum(sum(p_bar(2:thetha_nodes-1,
 2:r_nodes-1)))) * (dthetha * dr);
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%

% Displaying Results
end
disp(' ')
t_time=clock;
disp(['================================ ',date,'
================================'])
disp(['============= Steady State Analysis of Hydrodynamic Slider
Bearings ============'])
disp(['================================= Time
',num2str(t_time(4)),':',num2str(t_time(5)),'
================================='])
disp('***************************************************************************
sprintf("Load Carrying Capacity (Non-Dimensionalized Value) : %f",
Load_capacity)
disp('***************************************************************************
```

ans =

"iter: 1 conv: 1.000000"

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"iter: 3 conv: 0.315017"

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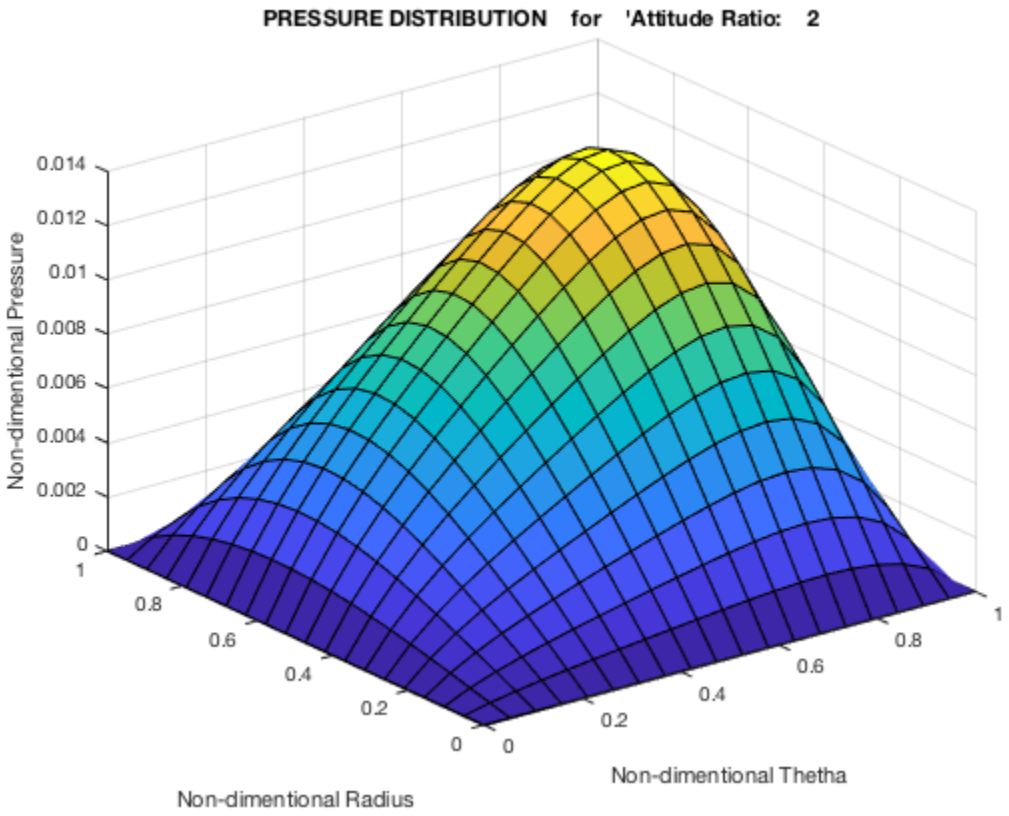
================================ 05-May-2018
 ================================
============= Steady State Analysis of Hydrodynamic Slider Bearings
 =============
================================ Time 1:23
 ================================
**************************************************************************

ans =

    "Load Carrying Capacity (Non-Dimensionalized Value) : 0.005519"
```

****



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