1. ***FINDING "D" AND "L" OF ARMATURE AND VERIFYING IT USING PERIPHERAL SPEED AND EMF INDUCED PER TURN RESPECTIVELY***

# CODE:

clc

P=input('Enter the power rating of the machine,P:');

v= input('Enter the terminal voltage of the machine,V:'); p= input('Enter the number of poles of the machine,p:'); N= input('Enter the speed of the machine,N:');

Bav= input('Enter the specific magnetic loading,Bav:'); ac=input('Enter the specific electric loading ac:,'); eff=input('Enter the efficiency of the machine,eff:'); si=input('Enter the ratio of pole arc to pole pitch,si:'); n=(N/60);

Mac\_type=input('if generator enter 1 otherwise 0, Mac\_type: '); if(Mac\_type==1)

Pa=(P/eff); disp(Pa) else Pa=(P);

disp(P) end

Co = ((pi^2)\*Bav\*ac\*(1/1000)); disp(Co)

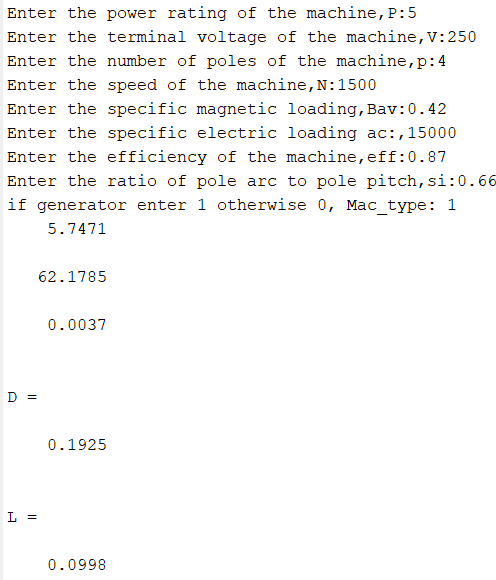
%Calculate D^2\*L x=(Co\*n);

D\_L = Pa./x; disp(D\_L)

LD\_ratio = si\*(pi/p);

D = ((D\_L)/LD\_ratio).^(1/3) L = LD\_ratio\*D

# OUTPUT:

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1. ***NUMBER OF POLES vs DIAMETER AND NUMBER OF POLES vs LENGTH***

# CODE:

clc; clear;

% Given machine specs (constants) P = 5000;

eff = 0.87;

Bav = 0.42;

ac = 15000;

si = 0.66;

N = 1500;

Mac\_type = 1;

n = N / 60;

% Adjust power input (Pa) if Mac\_type == 1

Pa = P / eff; else

Pa = P;

end

% Calculate constant Co

Co = (pi^2) \* Bav \* ac / 1000;

% Range of poles p\_range = 2:2:12;

% Initialize arrays

D\_vals = zeros(size(p\_range)); L\_vals = zeros(size(p\_range));

% Calculate Diameter and Length for each pole count for i = 1:length(p\_range)

p\_i = p\_range(i);

% Length to diameter ratio LD\_ratio = si \* (pi / p\_i);

% Calculate D^2 \* L D\_L = Pa / (Co \* n);

% Calculate Diameter (D) and Length (L) D = (D\_L / LD\_ratio)^(1/3);

L = LD\_ratio \* D;

D\_vals(i) = D;

L\_vals(i) = L;

end

% Plot Poles vs Diameter and Length figure;

subplot(2,1,1);

plot(p\_range, D\_vals, '-o', 'LineWidth', 2, 'MarkerSize', 8); xlabel('Number of Poles');

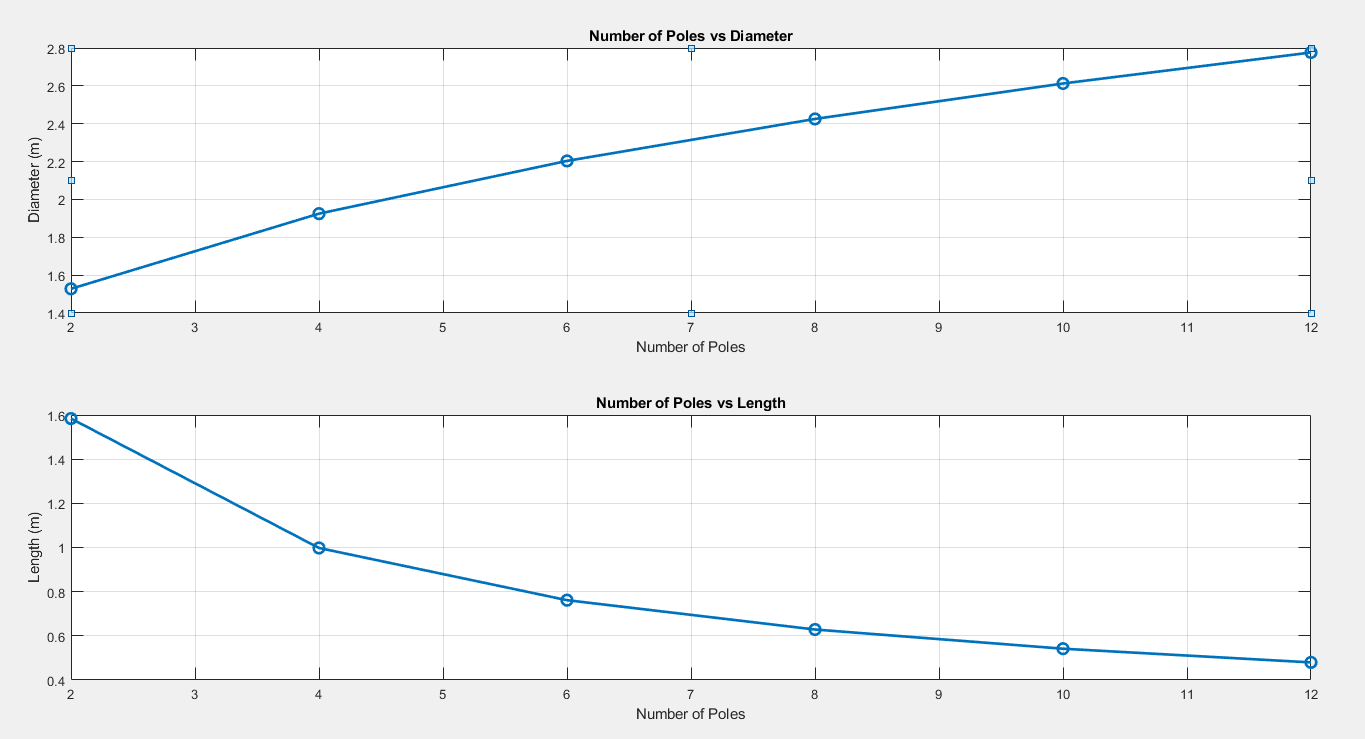
ylabel('Diameter (m)'); title('Number of Poles vs Diameter'); grid on;

subplot(2,1,2);

plot(p\_range, L\_vals, '-o', 'LineWidth', 2, 'MarkerSize', 8); xlabel('Number of Poles');

ylabel('Length (m)'); title('Number of Poles vs Length'); grid on;

# OUTPUT:

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1. ***SPEED vs DIAMETER AND SPEED vs LENGTH***

# CODE:

clc; clear;

% Given machine specs (constants)

P = 5000; % Power in watts

eff = 0.87; % Efficiency (decimal)

Bav = 0.42; % Specific magnetic loading in Tesla ac = 15000; % Specific electric loading in A/m

si = 0.66; % Pole arc to pole pitch ratio p = 4; % Fixed number of poles Mac\_type = 1; % Generator (1)

% Adjust power input (Pa) if Mac\_type == 1

Pa = P / eff; else

Pa = P;

end

% Calculate constant Co

Co = (pi^2) \* Bav \* ac / 1000;

% Speed range from 1000 to 1500 rpm in increments of 100 speed\_range = 1000:100:1500;

% Initialize arrays for Diameter and Length D\_vals = zeros(size(speed\_range));

L\_vals = zeros(size(speed\_range)); for i = 1:length(speed\_range)

N = speed\_range(i);

n = N / 60; % Convert rpm to rps

% Length to diameter ratio (constant for fixed poles) LD\_ratio = si \* (pi / p);

% Calculate D^2 \* L D\_L = Pa / (Co \* n);

% Calculate Diameter (D) and Length (L) D = (D\_L / LD\_ratio)^(1/3);

L = LD\_ratio \* D;

D\_vals(i) = D;

L\_vals(i) = L;

end

% Plot Speed vs Diameter and Length figure;

subplot(2,1,1);

plot(speed\_range, D\_vals, '-s', 'LineWidth', 2, 'MarkerSize', 8); xlabel('Speed (rpm)');

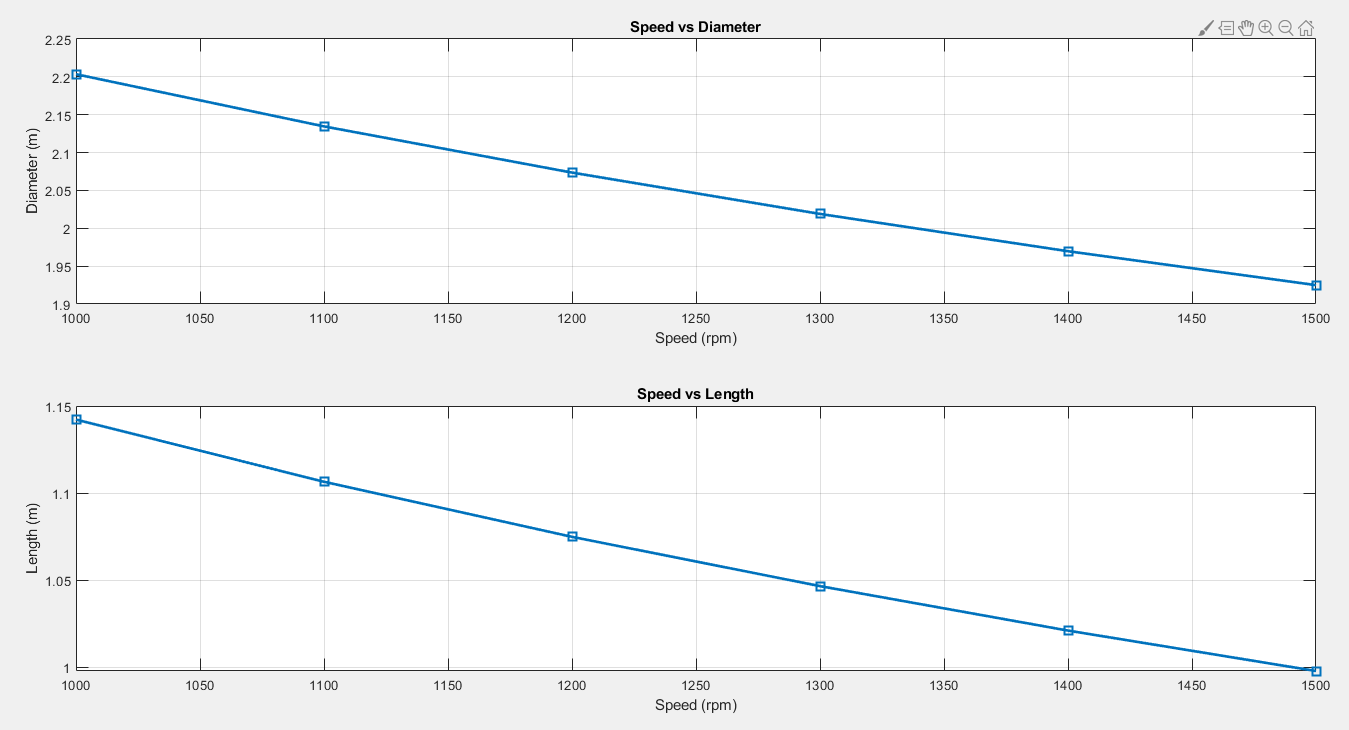
ylabel('Diameter (m)'); title('Speed vs Diameter'); grid on;

subplot(2,1,2);

plot(speed\_range, L\_vals, '-s', 'LineWidth', 2, 'MarkerSize', 8); xlabel('Speed (rpm)');

ylabel('Length (m)'); title('Speed vs Length'); grid on;

**OUTPUT:**

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