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clear all
clc
close all
format short

% Cálculo numérico para engenharia elétrica com Matlab
% Capítulo 4: Ajuste de curvas
% Ajuste de curvas com funções senoidais

T = 0.01666;
n = 9;
t = linspace(0,T,n)
w = 2*pi*60;
y = 0 + 311*sin(w*t + 0)
y = [0 220 311 220 0 -220 -311 -220 0] % para n = 9

n = length(t); % número de amostras

plot(t,y,'ko','MarkerEdgeColor','k',...
      'MarkerSize',10)
grid on, hold on

sy = sum(y)
A0 = sy/n
m=3
for k=1:m
    for i=1:n
        ycos(i) = y(i)*cos(k*w*t(i));
        ysin(i) = y(i)*sin(k*w*t(i));
    end
    A(k) = (2/n)*sum(ycos);
    B(k) = (2/n)*sum(ysin);
end
A
B
for k=1:m
    for i=1:n
        f(k,i) = A(k)*cos(k*w*t(i)) + B(k)*sin(k*w*t(i));
    end
end
for i=1:n
    ff(i) = A0 + sum(f(:,i));
end
ff

plot(t,ff,'ks','MarkerEdgeColor','k',...
      'MarkerFaceColor','k',...
      'MarkerSize',10)

T = 0.01666;
t = linspace(0,T,120)
w = 2*pi*60;
y = 0 + 311*sin(w*t + 0)
%y = [0 220 311 220 0 -220 -311 -220 0]
n = length(t); % número de amostras

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sy = sum(y)
A0 = sy/n
m=3
for k=1:m
    for i=1:n
        ycos(i) = y(i)*cos(k*w*t(i));
        ysin(i) = y(i)*sin(k*w*t(i));
    end
    A(k) = (2/n)*sum(ycos);
    B(k) = (2/n)*sum(ysin);
end

for k=1:m
    for i=1:n
        f(k,i) = A(k)*cos(k*w*t(i)) + B(k)*sin(k*w*t(i));
    end
end
for i=1:n
    ff(i) = A0 + sum(f(:,i));
end
A
B
ff
plot(t,ff,'k-','LineWidth',2)

xlabel('Tempo (s)')
ylabel('V (V)')
axis([0 0.01666 -315 315])
legend('9 pontos medidos','m=3 para 9','m=3 para 120')

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