Praktikum III

Kuliah Pemrosesan Sinyal

Praktikum IV pemrosesan sinyal akan membahas Deret Fourier.

Tujuan : - Memahami penerapan Deret Fourier

* Memahami dampak Fenomenon Gibb

Peralatan : laptop/PC dengan matlab dan DSP toolbox.

Percobaan 4.1

Prosedur :

1. Double-click Matlab/scilab
2. Buka text editor matlab (icon persegi putih, sisi kiri) atau menggunakan sembarang text editor, seperti notepad, wordpad dll.
3. Ketik command line dibawah ini

%Fenomenon Gibb

t=linspace(-2,2,2000);

u=linspace(-2,2,2000);

sq=[zeros(1,500),2\*ones(1,1000),zeros(1,500)];

k=2;

N=[1,3,7,19,49,70];

for n=1:6;

an=[];

for m=1:N(n)

an=[an,2\*k\*sin(m\*pi/2)/(m\*pi)];

end;

fN=k/2;

for m=1:N(n)

fN=fN+an(m)\*cos(m\*pi\*t/2);

end;

nq=int2str(N(n));

subplot(3,2,n),plot(u,sq,'r','LineWidth',2);hold on;

plot(t,fN,'LineWidth',2); hold off; axis([-2 2 -0.5 2.5]);grid;

xlabel('Time'), ylabel('y\_N(t)');title(['N= ',nq]);

end;

1. Save dengan nama gibb.m; letakkan pada direktori dimana matlab dieksekusi (lihat “current folder”). Lalu run. Apa yang anda amati ?
2. Lakukan perubahan pada N=[1,3,7,19,49,70]; Apa yang terjadi ? Jelaskan mengapa !
3. Dengan variabel N menyesuaikan (lihat langkah no.5), perpendek dan perpanjang lebar kotak pada variabel sq. Apa yang anda amati ?

Percobaan 4.2

Prosedur :

1. Double-click Matlab/scilab
2. Buka text editor matlab (icon persegi putih, sisi kiri) atau menggunakan sembarang text editor, seperti notepad, wordpad dll.
3. Ketik command line dibawah ini

% \*\*\* Plot truncatated FS for various numbers of terms. \*\*\*

clear; % clear matlab's memory

figure(1); clf; % open and clear figure 1

To = 2; wo = 2\*pi/To; % fundamental period and frequency

D0 = 0.5; % signal offset

t = -2:0.01:4; % time over which we'll plot signal

N = [1 5 10 50]; % +/- values at which we'll truncate FS

for i = 1:4, % compute truncated FS for above N values

f = D0\*ones(size(t)); % start out with DC bias term

for n = -N(i):-1, % loop over negative n

Dn = (1 - exp(-j\*n\*pi))/(j\*2\*pi\*n); % Fourier coefficient

f = f + real(Dn\*exp(j\*n\*wo\*t)); % add FS terms

end;

for n = 1:N(i), % loop over positive n

Dn = (1 - exp(-j\*n\*pi))/(j\*2\*pi\*n); % Fourier coefficient

f = f + real(Dn\*exp(j\*n\*wo\*t)); % add FS terms

end;

subplot(2,2,i); % plot truncated FS representation of f(t)

plot(t,f); % and actual signal

hold on;

plot([-2 -1 -1 0 0 1 1 2 2 3 3 4 4],[1 1 0 0 1 1 0 0 1 1 0 0 1],':');

hold off;

xlabel('t ');

ylabel('f(t)');

titlevec = ['Truncated f(t) FS for n = ' num2str(-N(i)),',..,',num2str(N(i))];

title(titlevec);

end;

% \*\*\* Plot exponential magnitude and phase spectra for 1st 4 harmonics

clear; % clear matlab's memory

figure(2); clf; % open and clear figure 2

To = 2; wo = 2\*pi/To; % fundamental period and frequency

D0 = 0.5; % signal offset, 0 frequency term

i = 1; % vector index to help store Dn and w

for n = -4:-1, % loop over negative n

Dn(i) = (1 - exp(-j\*n\*pi))/(j\*2\*pi\*n); %Compute&store fouriercoef.

w(i) = n\*wo; % store associated frequency

i = i + 1; % increment vector index

end;

Dn(i) = D0; w(i) = 0; % store 0 frequency terms

i = i + 1; % increment vector index

for n = 1:4, % loop over positive n

Dn(i) = (1 - exp(-j\*n\*pi))/(j\*2\*pi\*n); %Compute&store Fourier coef.

w(i) = n\*wo; % store associated frequency

i = i + 1; % increment vector index;

end;

subplot(2,1,1); % plot magnitude spectrum of f(t)

stem(w,abs(Dn),'filled');

xlabel('\omega ');

ylabel('|D\_n|');

title('Magnitude Spectrum of f(t) Showing First Four Harmonics');

subplot(2,1,2); % plot phase spectrum of f(t)

stem(w,angle(Dn),'filled');

xlabel('\omega ');

ylabel('\angle D\_n ');

title('Phase Spectrum of f(t) Showing First Four Harmonics');

1. Apa yang anda amati ?
2. Mengapa perlu off-set ?
3. Ubah parameter n lebih besar dan lebih kecil. Apa yang anda peroleh ?

Percobaan 4.3

Prosedur :

1. Double-click Matlab/scilab
2. Buka text editor matlab (icon persegi putih, sisi kiri) atau menggunakan sembarang text editor, seperti notepad, wordpad dll.
3. Ketik command line dibawah ini

% \*\*\* Plot truncatated FS for various numbers of terms. \*\*\*

clear; % clear matlab's memory

figure(1); clf; % open and clear figure 1

To = 1; wo = 2\*pi/To; % fundamental period and frequency

D0 = -0.5; % signal offset

t = -1:0.01:2; % time over which we'll plot signal

N = [1 5 10 50]; % +/- values at which we'll truncate FS

for i = 1:4, % compute truncated FS for above N values

f = D0\*ones(size(t)); % start out with DC bias term

for n = -N(i):-1, % loop over negative n

Dn = j/(2\*pi\*n); % Fourier coefficient

f = f + real(Dn\*exp(j\*n\*wo\*t)); % add FS terms

end;

for n = 1:N(i), % loop over positive n

Dn = j/(2\*pi\*n); % Fourier coefficient

f = f + real(Dn\*exp(j\*n\*wo\*t)); % add FS terms

end;

subplot(2,2,i); % plot truncated FS representation of f(t)

plot(t,f); % and actual signal

hold on;

plot([-1 0 0 1 1 2],[-1 0 -1 0 -1 0],':');

hold off;

xlabel('t ');

ylabel('f(t)');

titlevec = ['Truncated f(t) FS for n = ' num2str(-N(i)),',..,',num2str(N(i))];

title(titlevec);

end;

% \*\*\* Plot exponential magnitude and phase spectra for 1st 4 harmonics

clear; % clear matlab's memory

figure(2); clf; % open and clear figure 2

To = 1; wo = 2\*pi/To; % fundamental period and frequency

D0 = -0.5; % signal offset, 0 frequency term

i = 1; % vector index to help store Dn and w

for n = -4:-1, % loop over negative n

Dn(i) = j/(2\*pi\*n); % Compute & store fourier coef.

w(i) = n\*wo; % store associated frequency

i = i + 1; % increment vector index

end;

Dn(i) = D0; w(i) = 0; % store 0 frequency terms

i = i + 1; % increment vector index

for n = 1:4, % loop over positive n

Dn(i) = j/(2\*pi\*n); % Compute & store Fourier coef.

w(i) = n\*wo; % store associated frequency

i = i + 1; % increment vector index;

end;

subplot(2,1,1); % plot magnitude spectrum of f(t)

stem(w,abs(Dn),'filled');

xlabel('\omega ');

ylabel('|D\_n|');

title('Magnitude Spectrum of f(t) Showing First Four Harmonics');

subplot(2,1,2); % plot phase spectrum of f(t)

stem(w,angle(Dn),'filled');

xlabel('\omega ');

ylabel('\angle D\_n ');

title('Phase Spectrum of f(t) Showing First Four Harmonics');

1. Apa bedanya dengan percobaan 2.2 ?
2. Apa perbedaan antara percobaan 2.2 dan percobaan 2.3 pada magnitude spectrum dan fase dari spectrum ?
3. Silakan rubah periode dasar (fundamental period) dengan berbagai angka (minimal empat buah periode yang berbeda). Apa perubahan yang terjadi pada magnitude spectrum dan fase spectrum ?

Laporan Praktikum disusun dengan menjawab semua pertanyaan setelah langkah ke-3 prosedur praktikum. Sertakan semua plot dan modifikasi source code yang anda buat. Semakin kreatif mengubah source code dan membahas dalam laporan, anda akan mendapat nilai ekstra. Jangan terlambat mengumpulkan ! Mencontek/menjiplak akan diberi nilai E !

Have fun !

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