DTFS Octave Codes (2A)

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This document was produced by using OpenOffice and Octave.

Based on
M.J. Roberts, Fundamentals of Signals and Systems

DTFS example 1

```
NF = 4;
n = [0:NF-1]';
x = 8*sin(pi*n/2);
X = fft(x)/NF;
```

```
X =

   0.00000 + 0.00000i
  -0.00000 - 4.00000i
   0.00000 + 0.00000i
  -0.00000 + 4.00000i
```

DTFS example 2

```
NF = 8;
n = [0:NF-1]';
x = cos(2*pi*n/NF);
X = fft(x)/NF;

X =

  -0.00000 + 0.00000i
   0.50000 - 0.00000i
   0.00000 + 0.00000i
  -0.00000 - 0.00000i
   0.00000 + 0.00000i
  -0.00000 + 0.00000i
   0.00000 - 0.00000i
   0.50000 + 0.00000i
```

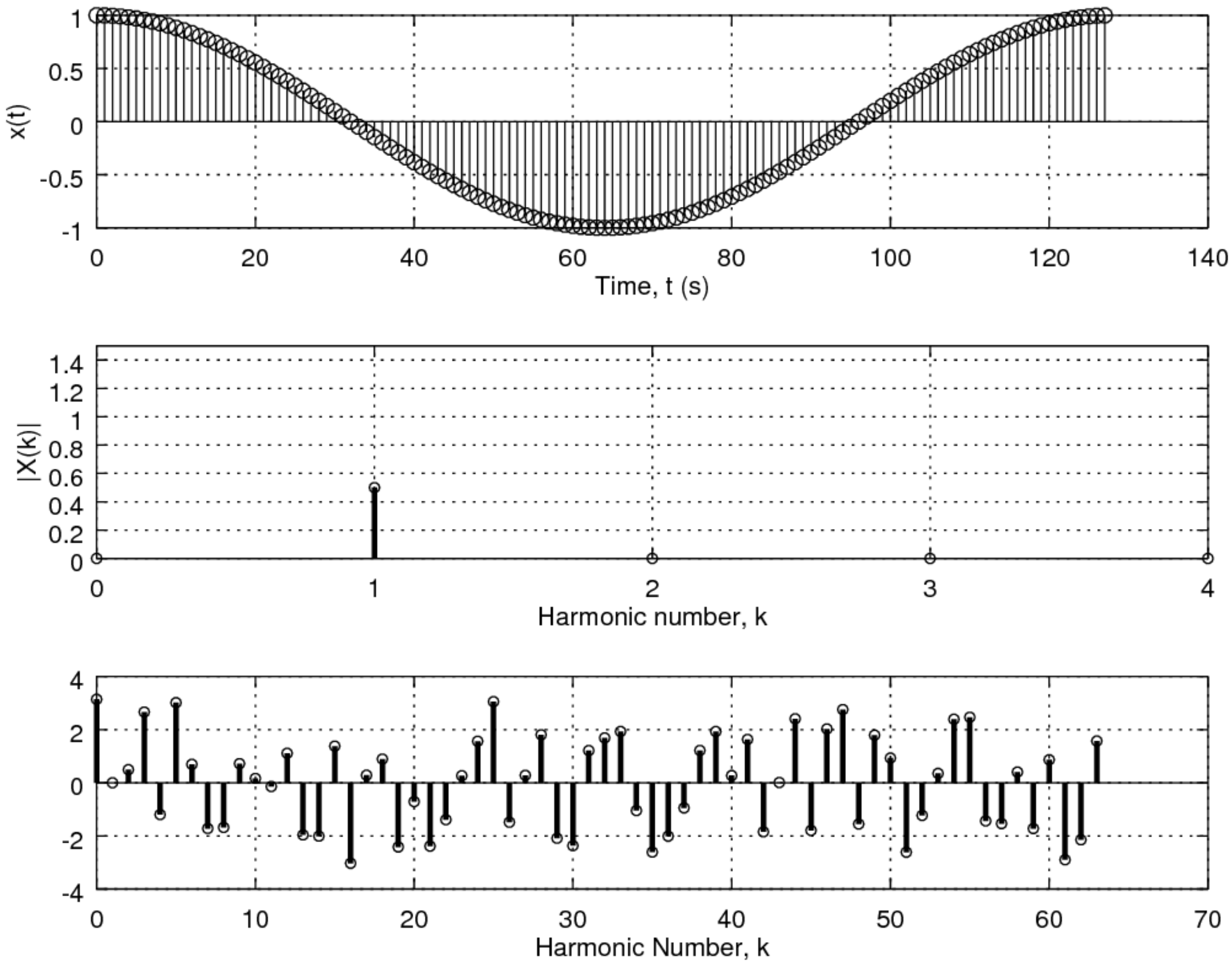
DTFS example 3

```
NF =128;
n = [0:NF-1]';
x = cos(2*pi*n/NF);
X = fft(x)/NF;


k = [0:NF/2-1];

TimeFreqPlot(n, x, k, X, NF);
```

DTFS example 3



Normalized ω_s and ω_0

```
N0 = 8;
n = [0:N0-1];
x = impD(n-3);
X = fft(x)/N0;


N0 = 10;
K = [0:N0-1]’;
Y = impND(N0,k-2-1) + impND(N0,k-2+1) + impND(N0,k+2-1) + ...
     impND(N0,k-2+1);
y = ifft(Y)*N0;


N = [0:N0-1];
Y = 4*cos(2*pi*n/10).*cos(2*pi*n/5);
```

Normalized ω_s and ω_0

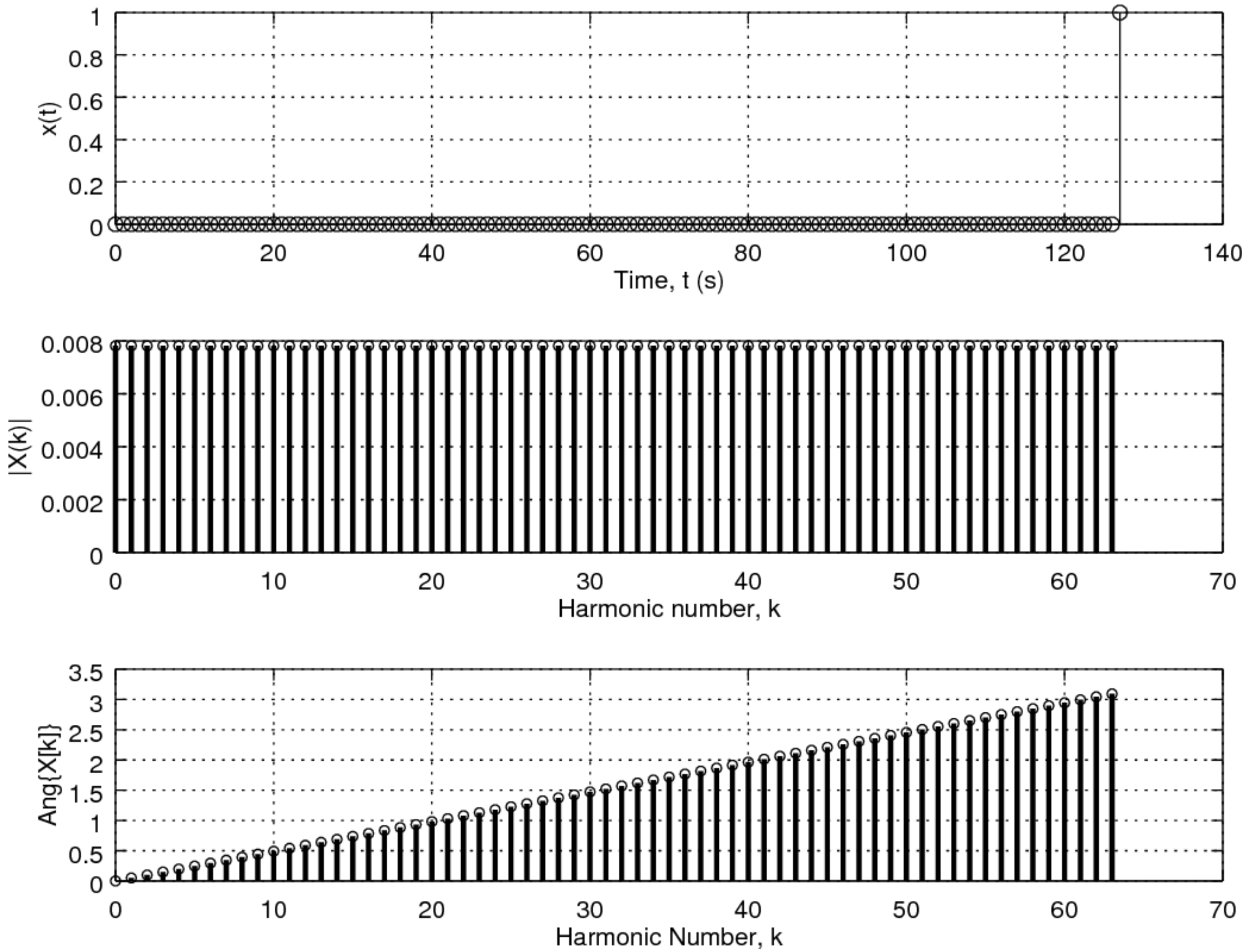
```
source 'func.m'

NF = 128;
n = [0:NF-1];
x = impD(n-127);
X = fft(x)/NF;

k = [0:NF/2-1];

TimeFreqPlot(n, x, k, X, NF);
```

Normalized ω_s and ω_0



Normalized ω_s and ω_0

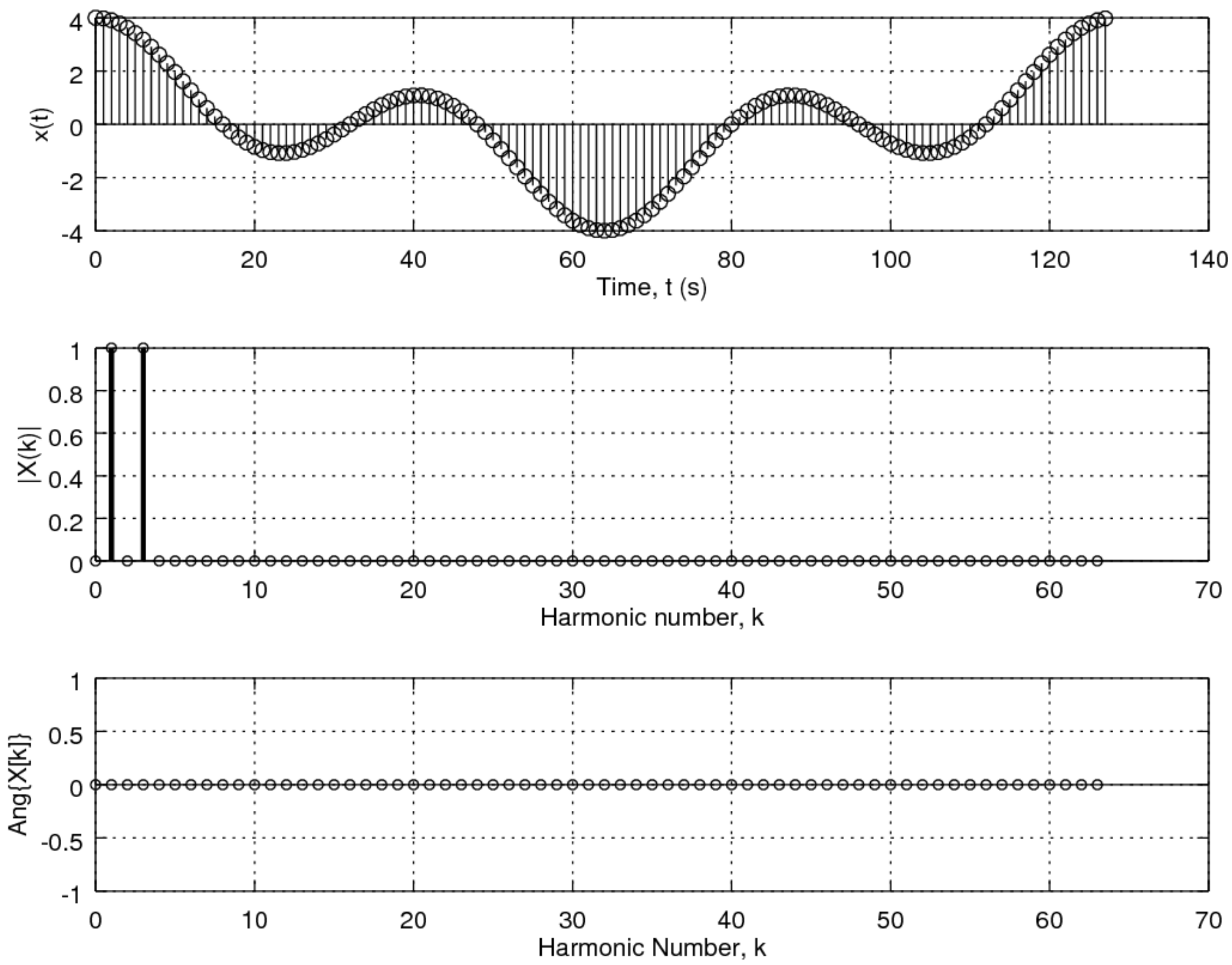
```
source 'func.m'

NF = 128;
k = [0:NF-1]';
Y = impND(NF,k-2-1) + impND(NF,k-2+1) + ...
    impND(NF,k+2-1) + impND(NF,k+2+1);
y = ifft(Y)*NF;

n = [0:NF-1]';
k = [0:NF/2-1]';
x = y;
X = Y(1:NF/2);

TimeFreqPlot(n, x, k, X, NF);
```

Normalized ω_s and ω_0



Normalized ω_s and ω_0

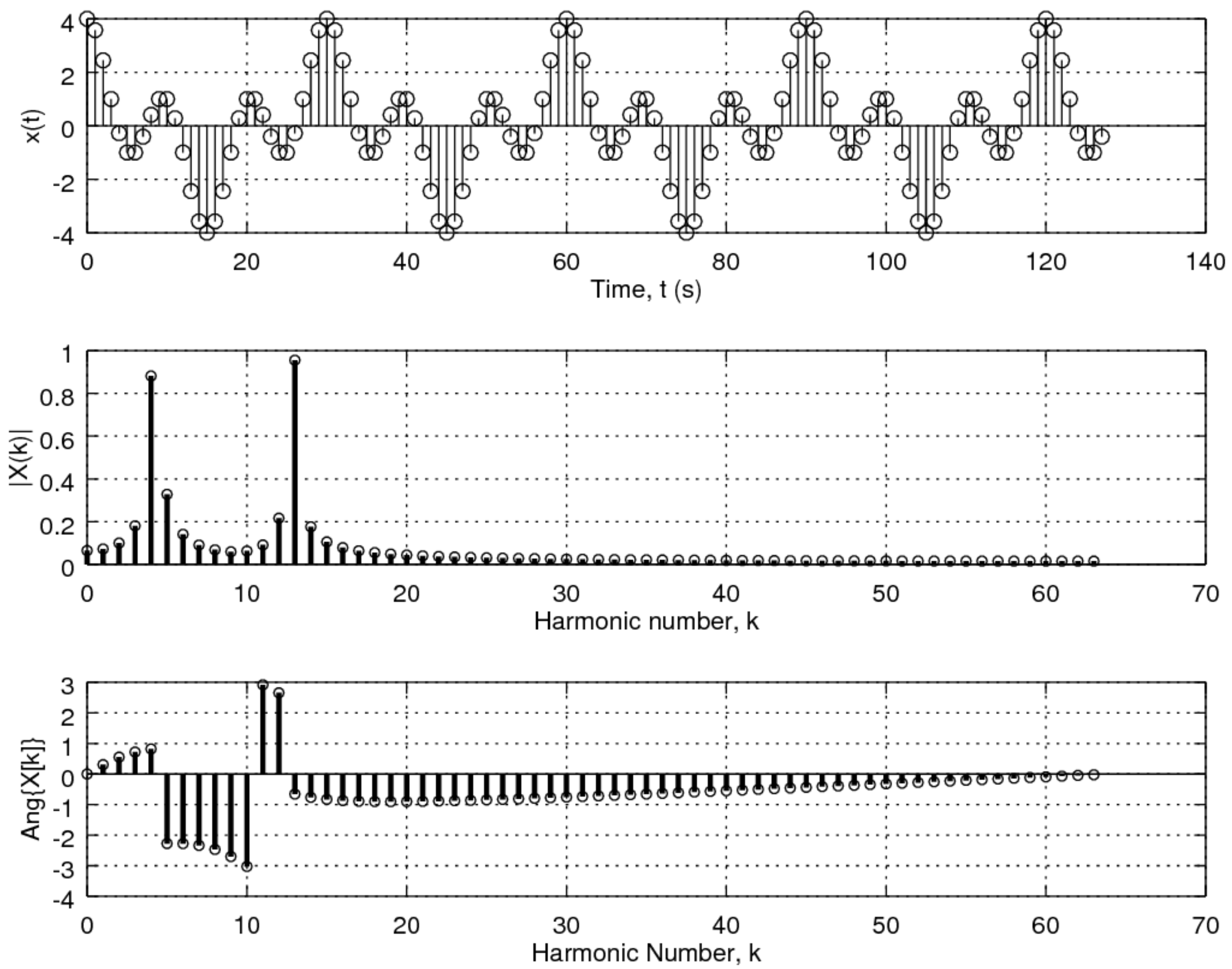
```
source 'func.m'

NF = 128;
n = [0:NF-1];
x = 4*cos(2*pi*n/30) .* cos(2*pi*n/15);
X = fft(x)/NF;

k = [0:NF/2-1];

TimeFreqPlot(n, x, k, X, NF);
```

Normalized ω_s and ω_0



Normalized ω_s and ω_0

```
N0 = 15;
N = [0:N0-1];
x = cos(2*pi*n/3) + impND(5,n);
X = fft(x)/N0;
X

N=[-10:40]'
yp = 0*n
for k = 0:3
yp = yp + (0.25/(1.25 – exp(-j*2*pi*k/4))) * exp(j*2*pi*n*k);
end
```

References

[1] http://en.wikipedia.org/
[2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
[3] M.J. Roberts, Fundamentals of Signals and Systems
[4] S.J. Orfanidis, Introduction to Signal Processing
[5] K. Shin, et al., Fundamentals of Signal Processing for Sound and Vibration Engineerings

[6] A “graphical interpretation” of the DFT and FFT, by Steve Mann