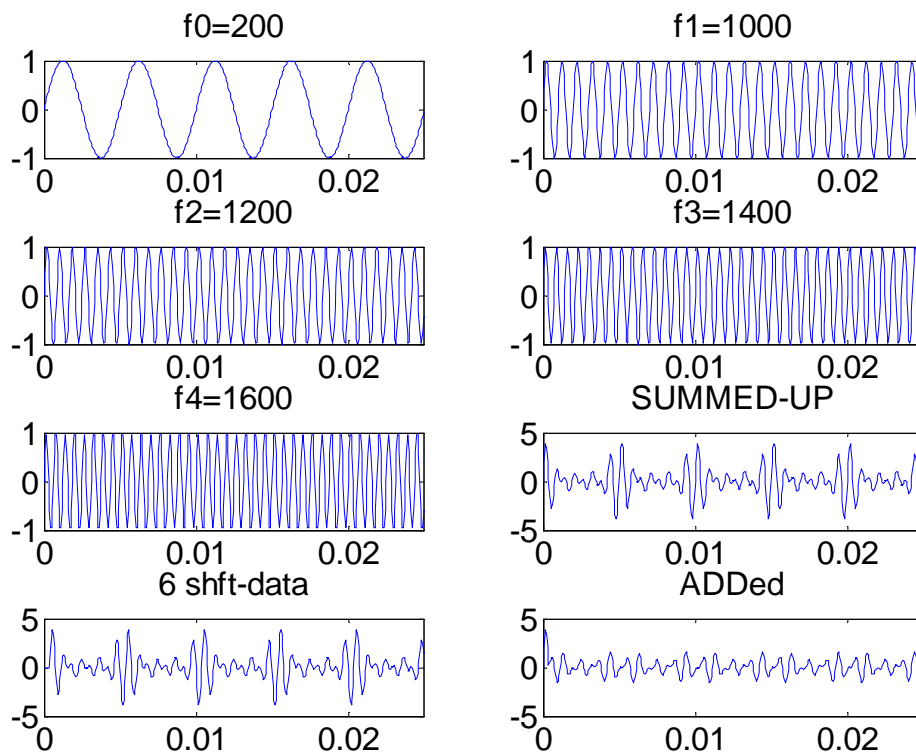


サンプルプログラム (音の合成、デジタルフィルタの基礎)



(MATLAB ソースプログラム)

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%% EXERCISE OF FILTER %%%%%%%%%
%%%%%%%% "exFlt.m", aito, 2008/02/12 %%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

%% INITIALIZATION

```
clear; clc; clf; close all;
```

```
set(0, 'DefaultUIControlFontSize', 16);
set(0, 'DefaultAxesFontSize', 16);
set(0, 'DefaultTextFontSize', 16);
```

```
set(0, 'DefaultLineLineWidth', 1);
set(0, 'DefaultAxesLineWidth', 1);
set(0, 'DefaultTextLineWidth', 1);
```

```
set(0, 'DefaultTextFontName', 'Helvetica');
set(0, 'DefaultAxesFontName', 'Helvetica');
```

%% CAL DATA

```
fs=16*10^3;
tend=1;
t=0:1/fs:tend;
```

```
f0=200; f1=1000; f2=1200; f3=1400; f4=1600;
Y0=1; Y1=1; Y2=1; Y3=1; Y4=1;
```

```
y0=Y0*sin(2*pi*f0*t);
y1=Y1*sin(2*pi*f1*t);
y2=Y2*sin(2*pi*f2*t);
y3=Y3*sin(2*pi*f3*t);
y4=Y4*sin(2*pi*f4*t);
```

```
y=y1+y2+y3+y4;          % SUM-UP OF HARMONICS
```

```
tshft=6;                % SHIFT OF SAMPLING TIME
yshft=[zeros(1,tshft) y]; % tshft smping time shift
yshft=yshft(1:length(y));
```

```
ysum=y+yshft;
```

```
% PLOT GRAPH
```

```
pltXpnts=400;
```

```
m=4; n=2;
```

```
subplot(m,n,1); plot(t(1:pltXpnts),y0(1:pltXpnts)); xlim([0 t(pltXpnts)]);
```

```
title(sprintf(' f0=%.0f',f0));
```

```
subplot(m,n,2); plot(t(1:pltXpnts),y1(1:pltXpnts)); xlim([0 t(pltXpnts)]);
```

```
title(sprintf(' f1=%.0f',f1));
```

```
subplot(m,n,3); plot(t(1:pltXpnts),y2(1:pltXpnts)); xlim([0 t(pltXpnts)]);
```

```
title(sprintf(' f2=%.0f',f2));
```

```
subplot(m,n,4); plot(t(1:pltXpnts),y3(1:pltXpnts)); xlim([0 t(pltXpnts)]);
```

```
title(sprintf(' f3=%.0f',f3));
```

```
subplot(m,n,5); plot(t(1:pltXpnts),y4(1:pltXpnts)); xlim([0 t(pltXpnts)]);
```

```
title(sprintf(' f4=%.0f',f4));
```

```
subplot(m,n,6); plot(t(1:pltXpnts),y(1:pltXpnts)); xlim([0 t(pltXpnts)]); title(' SUMMED-UP');
```

```
subplot(m,n,7); plot(t(1:pltXpnts),yshft(1:pltXpnts)); xlim([0 t(pltXpnts)]); title(sprintf('%d
shft-data',tshft));
```

```
subplot(m,n,8); plot(t(1:pltXpnts),ysum(1:pltXpnts)); xlim([0 t(pltXpnts)]); title(' ADDED');
```

```
%% SOUND
```

```
gain0=1/max(y0)*0.5; % ORIGINAL SOURCE DATA
```

```
sound(y0*gain0,fs);
```

```
%%
```

```
gain2=1/max(y2)*0.15; % HARMONICS DATA
```

```
sound(y1*gain2,fs);
```

```
%%
```

```
gain=1/max(y)*0.5; % SUMMED-UP WITH HARMONICS
```

```
sound(y*gain,fs);
```