

```
##### 2 Филтър #####
```

```
function Hd = FIR1
```

```
%FIR1 Returns a discrete-time filter object.
```

```
% MATLAB Code
```

```
% Generated by MATLAB(R) 9.5 and DSP System Toolbox 9.7.
```

```
% Generated on: 14-Apr-2020 10:04:34
```

```
% Equiripple Lowpass filter designed using the FIRPM function.
```

```
% All frequency values are in Hz.
```

```
Fs = 125; % Sampling Frequency
```

```
Fpass = 40; % Passband Frequency
```

```
Fstop = 45; % Stopband Frequency
```

```
Dpass = 0.057501127785; % Passband Ripple
```

```
Dstop = 0.0001; % Stopband Attenuation
```

```
dens = 20; % Density Factor
```

```
% Calculate the order from the parameters using FIRPMORD.
```

```
[N, Fo, Ao, W] = firpmord([Fpass, Fstop]/(Fs/2), [1 0], [Dpass, Dstop]);
```

```
% Calculate the coefficients using the FIRPM function.
```

```
b = firpm(N, Fo, Ao, W, {dens});
```

```
Hd = dfilt.dffir(b);
```

```
Ts = 0 : 1/Fs : 15 - 1/Fs;
```

```
N = length(Ts);
```

```
f1 = 30;
```

```
f2 = 40;
```

```
f3 = 50;
```

```
f4 = 60;
```

```
x = 0.5*sin(2*pi*f1*Ts) + ...  
    0.65*sin(2*pi*f2*Ts) + ...  
    0.8*sin(2*pi*f3*Ts) + ...  
    0.95*sin(2*pi*f4*Ts);
```

```
subplot(2, 2, 1);
```

```
plot(x); hold on; title('Исходный сигнал');
```

```
xlabel('Время'); ylabel('Амплитуда');
```

```
X = abs(fft(x));
```

```
Xm = 2*abs(X)/N;
```

```
subplot(2, 2, 2);
```

```
plot(X, Xm); grid on; title('БПФ Исходного сигнала');
```

```
xlabel('Частота'); ylabel('Амплитуда');
```

```
y = filter(Hd, x);
```

```
X = abs(fft(y));
```

```

subplot(2, 2, 3);
plot(y); grid on; title('Отфильтрованный сигнал');
xlabel('Время'); ylabel('Амплитуда');
Xm = 2 * abs(X) / N;
X = (0: N - 1) * Fs / N;
subplot(2, 2, 4);
plot(X, Xm); grid on; title('БПФ отфильтрованного сигнала');
xlabel('Частота'); ylabel('Амплитуда');

```

ans =

```

FilterStructure: 'Direct-Form FIR'
Arithmetic: 'double'
Numerator: [1x64 double]
PersistentMemory: false

```

