

## 6.4 设计Chebyshev数字带阻滤波器

6.4 利用双线性z变换法设计50Hz的Chebyshev数字带阻滤波器：

```
%-----  
% exa060603.m, for example 6.6.3;  
% To design IIR Buttworth bandstop DF by analog-lowpass,  
% -----  
clear all;  
  
fp=[44 56];fs=[47 53];  
%wp=[.19*pi 0.21*pi];ws=[.198*pi 0.202*pi];  
Fs=1000;  
rp=3;rs=50;  
wp=fp*2*pi/Fs;ws=fs*2*pi/Fs;  
%  
% Firstly to finish frequency prewarping;  
wap=2*Fs*tan(wp./2)
```

```
wap = 1x2  
      278.2345   355.5340
```

```
was=2*Fs*tan(ws./2);  
[n,wn]=cheb1ord(wap,was,rp,rs,'s');  
% Note: 's'!  
[z,p,k]=cheb1ap(n,rp);  
[b,a]=zp2tf(z,p,k)
```

```
b = 1x7  
      0          0          0          0          0          0      0.0313  
a = 1x7  
      1.0000      0.5707      1.6628      0.6906      0.6991      0.1634      0.0442
```

```
bw=wap(2)-wap(1)
```

```
bw = 77.2995
```

```
w0=sqrt(wap(1)*wap(2))
```

```
w0 = 314.5184
```

```
[bt,at]=lp2bs(b,a,w0,bw)
```

```
bt = 1x13  
1029 x  
      0.0000      -0.0000      0.0000      -0.0000      0.0000      -0.0000      0.0000      -0.0000 ...  
at = 1x13  
1029 x  
      0.0000      0.0000      0.0000      0.0000      0.0000      0.0000      0.0000      0.0000 ...
```

```
%  
% Note: z=(2/ts)(z-1)/(z+1);
```

```
[bz1,az1]=bilinear(bt,at,Fs)
```

```
bz1 = 1×13  
    0.6089    -6.9539    36.7445   -118.7534   261.3934   -412.7774   479.4758   -412.7774 ...  
az1 = 1×13  
    1.0000   -11.1145    57.1903   -180.1085   386.5896   -595.7513   675.8540   -568.7217 ...
```

```
[h,w]=freqz(bz1,az1,256,Fs);  
figure(1)  
plot(w,20*log10(abs(h)))
```

