Ch5 数字滤波器设计

巴特沃斯模拟滤波器零极点

课本P178 图5-24

% 巴特沃斯模拟滤波器幅度平方函数极点图

% Butterworth squared magnitude response function

figure;

alpha = 0:0.01:2\*pi;

x = cos(alpha);

y = sin(alpha);

plot(x,y,'--b');

hold on;

sys = tf([1],[-1 0 0 0 0 0 1]);

% sys =

% -1

% -------

% s^6 - 1

h = pzplot(sys,'r');

xlim([-1.2 1.2]);

ylim([-1.2 1.2]);

legend("N=3");

clear;

close all;

clc;

%--------------------------------------------------------------------------

%极零图

%--------------------------------------------------------------------------

figure;

alpha = 0:0.01:2\*pi;

x = cos(alpha);

y = sin(alpha);

plot(x,y,'--b');

hold on;

n = 3;

[z, p, k]=buttap(n);

[num,den] = zp2tf(z,p,k);

hs = tf(num,den);

% hs =

%

% 1

% ---------------------

% s^3 + 2 s^2 + 2 s + 1

pzplot(hs,'r');

xlim([-1.2 1.2]);

ylim([-1.2 1.2]);

xlabel('Real Axis');

ylabel('Imaginary Axis');

%--------------------------------------------------------------------------

%极零图

%--------------------------------------------------------------------------

figure;

str = ["N=1","N=2","N=3","N=4","N=5","N=6"];

N = 6;

for n = 1:N

[z, p, k]=buttap(n);

[num,den] = zp2tf(z,p,k);

subplot(3,2,n);

hs = tf(num,den);

zpk(hs);

pzmap(hs);

xlim([-1 1]);

ylim([-1 1]);

legend(str(n));

%hold on;

end