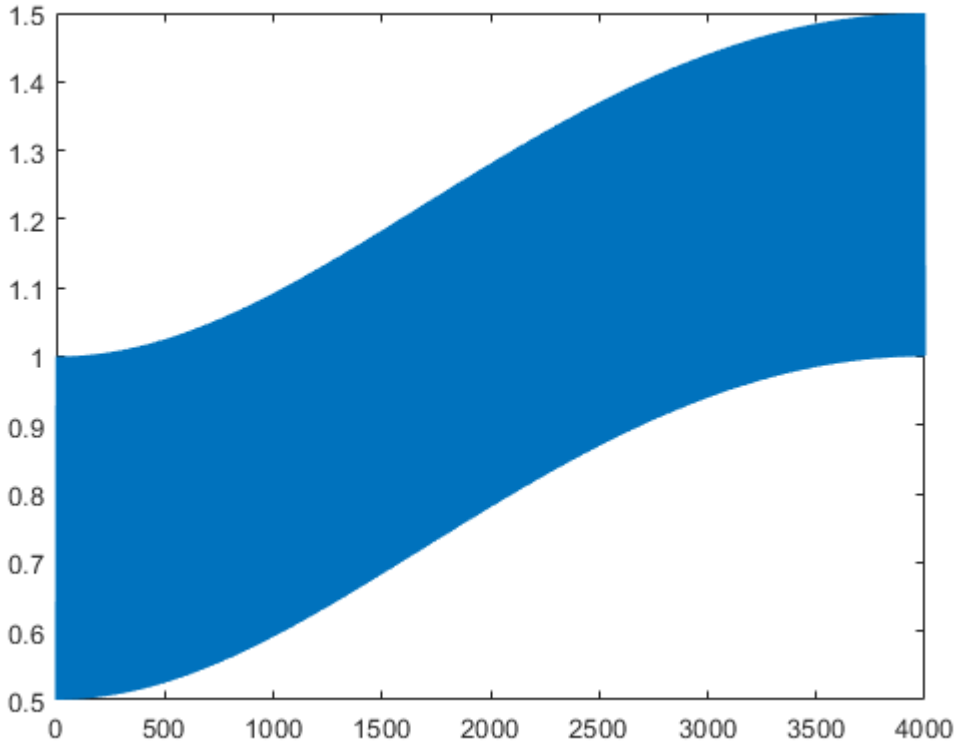
```
K = 0.5;

fs = 8000;

N = 2000;

L = 8000-N;

syms z n Y(z) X(z);

G = K;

D = z^-N;

H = 0.5+0.5*z^-1;

T1 = G*D*H;

Y = X/(1-T1);

H1 = simplify(Y/X);

disp("System's Transfet Function = ");

pretty(H1);

[Nn, D] = numden(H1);

poles = polynomialDegree(D);

fprintf("Number of Poles = %i Wn",poles);

Nc = eval(coeffs(Nn)); %Get coeffs and evaluatle symbolic variable, i.e. make real matrix

Dc = eval(coeffs(D));

Nc = Nc./(Dc(1)); %Turn into proper polynomial, first coeffs of a is 1

Dc = Dc./(Dc(1));

fprintf("System's Difference Equation will be :- Wn");

fprintf("%i y(n+%i)+ %f y(n+%i) + %i y(n) = %i x(n) Wn",Dc(3),N,Dc(2),N-1,Dc(2),Nc(1));
```

```
a = Nc(1);

b = [Dc(1) zeros(1,N-2) Dc(2) Dc(3)];

x = [randn(1,N) zeros(1,L)];

y = filter(a,b,x);

soundsc(y,fs);

fprintf("For output of 1 sec Duration N+L = %i \n",N+L);




[H,w] = freqz(b,a,2^16);

figure()

plot(w/pi*fs/2,abs(H))
```

```
System's Transfet Function =

          2001

       4 z

- -----------------

       2001

  - 4 z     + z + 1


Number of Poles = 2001

System's Difference Equation will be :-

-4 y(n+2000)+ 1.000000 y(n+1999) + 1 y(n) = -4 x(n)
```

For output of 1 sec Duration N+L = 8000



Published with MATLAB® R2019b