Analog Filter 1 - Chebyshev High Pass

- Amax=0.5dB
- Amin=30dB
- wp=3000Hz
- ws=2000Hz

```
%% Function Input

  >> Fspecs('Analog1')
  +-------------------------+
  |   Filter Information    |
  |-------------------------|
  |       HP/LP/BP/NP       |
  |       Butter/Chevy      |
  |       Ana/Dig           |
  +-------------------------+
  :  >>hp chevy ana
  +-----------------------+
  |   Enter Parameters    |
  +-----------------------+
  | Amax,Amin,Wp,Ws,Units |
  |   Units - Hz or R/S   |
  +-----------------------+
  :   >>0.5,30,3000,2000,hz
```

```
%% Display Output

  Section 1:
     [W0] = 47572.3800
     [Q] = 0.6836
     [Pole] = -1.85 + -1.72i
  Section 2:
     [W0] = 24539.8213
     [Q] = 1.8104
     [Pole] = -0.36 + -1.25i
  Section 3:
     [W0] = 18636.2473
     [Q] = 6.5128
     [Pole] = -0.08 + -0.99i
```

```
%% Filter Object

Analog1 =

  Chevy with properties:

         BPoles: [-4.0942e+03 + 1.5280e+04i ... ] (1x6 double)
              a: 0.3000
              b: 1.0440
             ws: 1.2566e+04
             wp: 1.8850e+04
           Amax: 0.5000
           Amin: 30
          ftype: 'HP'
        typenum: 2
              n: 6
            rat: 1.5000
          poles: [-0.0759 - 0.9858i -0.3596 - 1.2512i ... ] (1
             x6 double)
             w0: [4.7572e+04 2.4540e+04 1.8636e+04]
              Q: [0.6836 1.8104 6.5128]
            ws1: []
            ws2: []
            wp1: []
            wp2: []
             CF: []
        ischild: 0
    protoFilter: []
          Coeff: []
            dig: 0
```

Analog Filter 2 - Butterworth Band Pass

- Amax=1dB
- Amin=25dB
- wp1=5000Hz
- wp2=6000Hz
- ws1=4000Hz
- ws2=7000Hz

```
%% Function Input

  >> Fspecs('Analog2')
  +-------------------------+
  |   Filter Information    |
  |-------------------------|
  |      HP/LP/BP/NP        |
  |      Butter/Chevy       |
  |      Ana/Dig            |
  +-------------------------+
  :  >>butter bp ana
  +---------------------------------+
  |         Enter Parameters        |
  +---------------------------------+
  | Amax,Amin,Wp1,Wp2,Ws1,Ws2,Units |
  |         Units - Hz or R/S       |
  +---------------------------------+
  :   >>1,25,5000,6000,4000,7000,Hz
```

```
%% Display Output

  Section 1:
     [W0] = 33013.5553
     [Q] = 5.0115
     [Pole] = -3293.79 + -32848.83i
  Section 2:
     [W0] = 35874.7344
     [Q] = 5.0115
     [Pole] = -3579.25 + -35695.74i
  Section 3:
     [W0] = 31146.4368
     [Q] = 12.1486
     [Pole] = -1281.89 + -31120.05i
  Section 4:
     [W0] = 38025.2976
     [Q] = 12.1486
     [Pole] = -1565.01 + -37993.08i
```

```
%% Filter Object
```

```
  Analog2 =

  Butter with properties:

             ws: 1.7054e+04
             wp: 6.2832e+03
           Amax: 1
           Amin: 25
          ftype: 'BP'
        typenum: 3
              n: 8
            rat: 2.7143
          poles: [-1.2819e+03 - 3.1120e+04i ... ] (1x8 double)
             w0: [3.3014e+04 3.1146e+04 3.8025e+04 3.5875e+04]
              Q: [5.0115 12.1486 12.1486 5.0115]
            ws1: 2.6928e+04
            ws2: 4.3982e+04
            wp1: 3.1416e+04
            wp2: 3.7699e+04
             CF: 3.4414e+04
        ischild: 0
    protoFilter: [1x1 Butter]
          Coeff: []
            dig: 0
```

Digital Filter 1 - Chebyshev Low Pass

- Amax=0.5dB
- Amin=25dB
- wp=0.2Fs
- ws=0.25Fs

```
%% Function Input

  >> Fspecs('Digital1')
  +------------------------+
  |   Filter Information   |
  |------------------------|
  |      HP/LP/BP/NP       |
```

```
|      Butter/Chevy      |
|      Ana/Dig           |
+------------------------+
:  >>chevy lp dig
+-----------------------------------------------------------+
|                    Enter Parameters                       |
+-----------------------------------------------------------+
|                Amax,Amin,Wp,Ws,Units,Fs                   |
| Units - Hz or frac (Fractions of sampling frequency)      |
+-----------------------------------------------------------+
:   >>0.5,25,0.2,0.25,frac
```

```

%% Display Output

  Section 1:
     [W0] = 0.5758
     [Q] = 0.6836
     [Pole] = -0.29 + -0.27i
  Section 2:
     [W0] = 1.1161
     [Q] = 1.8104
     [Pole] = -0.21 + -0.74i
  Section 3:
     [W0] = 1.4697
     [Q] = 6.5128
     [Pole] = -0.08 + -1.01i
  Section 1:
     Num:  1.0000  2.0000  1.0000
     Den:  1.0000  -1.2196  0.4400
  Section 2:
     Num:  1.0000  2.0000  1.0000
     Den:  1.0000  -0.8502  0.6194
  Section 3:
     Num:  1.0000  2.0000  1.0000
     Den:  1.0000  -0.5566  0.8635
```

```

%% Filter Object

  Digital1 =

    Chevy with properties:
```

```
            BPoles: [-0.4481 + 1.6725i -1.2244 + 1.2244i ... ]
               (1x6 double)
                 a: 0.3000
                 b: 1.0440
                ws: 2.0000
                wp: 1.4531
              Amax: 0.5000
              Amin: 25
             ftype: 'LP'
           typenum: 1
                 n: 6
               rat: 1.3764
             poles: [0.2783 + 0.8866i 0.4251 + 0.6623i ... ] (1
                x6 double)
                w0: [1.4697 1.1161 0.5758]
                 Q: [6.5128 1.8104 0.6836]
               ws1: []
               ws2: []
               wp1: []
               wp2: []
                CF: []
          ischild: 0
      protoFilter: []
            Coeff: []
              dig: 0
```

Digital Filter 2- Butterworth Notch Filter

- Amax=1dB
- Amin=30dB
- wp1=0.1Fs
- wp2=0.25Fs
- ws1=0.15Fs
- ws2=0.2Fs

```

%% Function Input

  >> Fspecs
```

```
  Please enter problem name
  :   >>Digital2
  +-------------------------+
  |   Filter Information    |
  |-------------------------|
  |      HP/LP/BP/NP        |
  |      Butter/Chevy       |
  |      Ana/Dig            |
  +-------------------------+
  :  >>butter np dig
  +-----------------------------------------------------------+
  |                    Enter Parameters                       |
  +-----------------------------------------------------------+
  |           Amax,Amin,Wp1,Wp2,Ws1,Ws2,Units,Fs               |
  | Units - Hz or frac (Fractions of sampling frequency)      |
  +-----------------------------------------------------------+
  :   >>1,30,0.1,0.25,0.15,0.2,frac
```

```

%% Display Output

  Section 1:
     [W0] = 1.0151
     [Q] = 1.2585
     [Pole] = -0.40 + -0.93i
  Section 2:
     [W0] = 1.4587
     [Q] = 1.2585
     [Pole] = -0.58 + -1.34i
  Section 3:
     [W0] = 0.8172
     [Q] = 3.2290
     [Pole] = -0.13 + -0.81i
  Section 4:
     [W0] = 1.8121
     [Q] = 3.2290
     [Pole] = -0.28 + -1.79i
  Section 1:
     Num:  1.0000  -0.9193  1.0000
     Den:  1.0000  -0.8940  0.5144
  Section 2:
     Num:  1.0000  -0.9193  1.0000
     Den:  1.0000  -0.4433  0.4510
  Section 3:
```

```
    Num:   1.0000   -0.9193   1.0000
    Den:   1.0000   -1.2881   0.8043
  Section 4:
    Num:   1.0000   -0.9193   1.0000
    Den:   1.0000   -0.1705   0.7330
```

```

%% Filter Object

  Digital2 =

  Butter with properties:

            ws: 0.4340
            wp: 1.2596
          Amax: 1
          Amin: 30
         ftype: 'NP'
       typenum: 4
             n: 8
           rat: 2.9021
         poles: [0.6440 - 0.6241i 0.4470 - 0.5609i ... ] (1x8
            double)
            w0: [1.0151 0.8172 1.8121 1.4587]
             Q: [1.2585 3.2290 3.2290 1.2585]
           ws1: 1.0191
           ws2: 1.4531
           wp1: 0.7404
           wp2: 2.0000
            CF: 1.2169
       ischild: 0
    protoFilter: [1x1 Butter]
          Coeff: []
            dig: 1
```