

Informal MATLAB exercise in examination of magnitude (dB) response of filter with transfer function

$$H(z) = \frac{1 + z^{-1}}{1 - 0.5z^{-1}}$$

The m-file `freqzdB.m`, which I have given you on the Web, is used. You can use the MATLAB installed on any of our Linux machines or PCs, or on any other machine provided the Signal Processing Toolbox is also installed (I think the MG45 lab qualifies). To get into MATLAB v7 from the Linux command line, just say "matlab".

Two frequency responses are plotted. Then the poles and zeroes are plotted. This exercise is just to acquaint you with MATLAB as used in this course and should not be handed in.

I suggest you set up a new folder, e.g. "363 Matlab" to serve as your workspace for Matlab work in this course. Put into it my m-file `freqzdB.m`. When you open Matlab use the "current folder" history or its browse button to navigate to the "363 Matlab" folder.

```
>diary 10apr2-30.txt
```

This saves your MATLAB session, apart from graphs, on a file named `10apr2-30.txt` (day and time are convenient for such file names). If `10apr2-30` already exists, your session is appended to it. `>diary off` and `>diary on` turn it off and on respectively. `>diary` toggles it on and off.

```
>format short e
```

This display format will usually be convenient. It makes no difference to the underlying computation.

```
>b = [1,1];
```

numerator

```
>a = [1,-0.5];
```

denominator

```
>g0 = sum(b)/sum(a);
```

gain at zero frequency

```
>b = b/g0;
```

normalize gain at zero frequency

```
>[f,H] = freqzdB(b,a,101,0,0.5);
```

Magnitude (dB) response computed at 101 frequencies running from 0 to 0.5. The sampling frequency is assumed = 1.

```
>plot(f,H)
```

Print this graph. On Windows, this is done by just making sure the graph is the active window, then issuing the Print command.

On our Unix or Linux systems say `>print myplot1.ps`; this saves a postscript file that can be printed out after you have exited MATLAB, via `lpr -P?? myplot1.ps`. Postscript files are large so you should delete `myplot1.ps` as soon as practicable. If you are in a lab with a postscript printer then `>print -P??` should work while you are in MATLAB; no postscript file is saved.

```
>[f,H] = freqzdB(b,a,101,0,0.1);
```

New frequency interval.

```
>plot(f,H)
```

Print this graph.

```
>zplane(b,a)
```

Print z-plane plot of poles and zeroes.

```
>exit
```