ICE503 Homework-12

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Q. 3

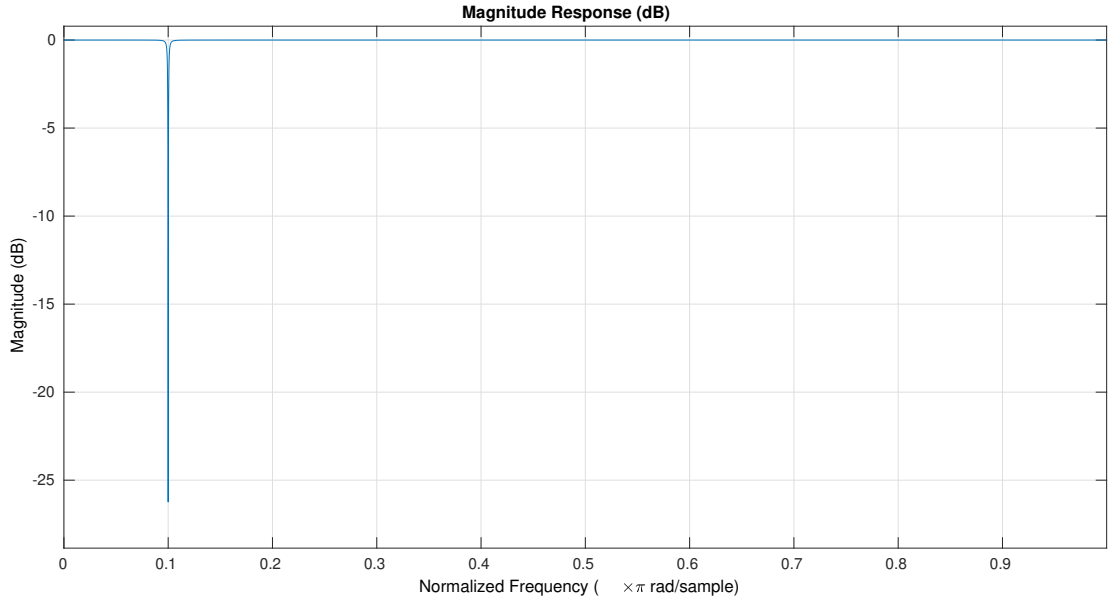

Fig. 1: Magnitude response of the IIR notch filter

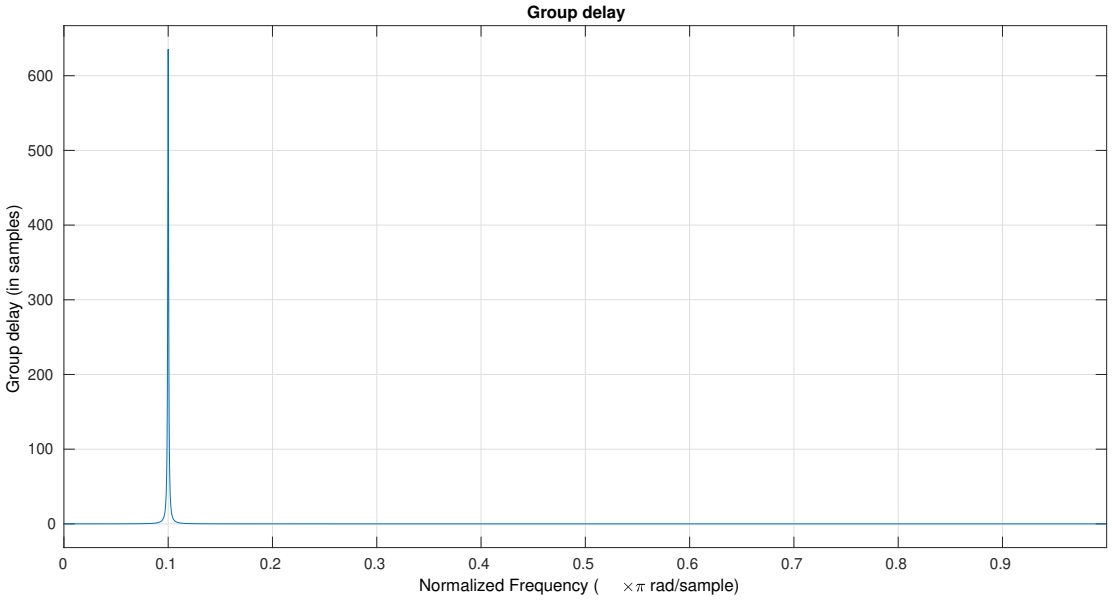

Fig. 2: Group delay response of the IIR notch filter

Designing an IIR Notch Filter Using MATLAB

The `iirnotch` function in MATLAB can be used to design a notch filter. The syntax is:

```
[b, a] = iirnotch(wo, bw);
```

where:

- wo $= \omega_c/\pi$: Normalized notch frequency (in the range [0, 1]),
- bw: Bandwidth in normalized frequency.

Given $\omega_c = 0.1\pi$ and bandwidth 0.001π, we calculate the normalized parameters as follows:

Normalized Parameters

$$\text{wo} = \frac{\omega_c}{\pi} = 0.1$$

$$\text{bw} = \frac{0.001\pi}{\pi} = 0.001$$

Generate Filter Coefficients

Use the `iirnotch` function to compute the filter coefficients b and a. The MATLAB code is:

```
% Design the notch filter
[b, a] = iirnotch(wo, bw);
```

Magnitude and Group Delay Plot

To plot the magnitude response and group delay, use the `fvtool` function. The MATLAB code is:

```
fvtool(b, a, 'Analysis', 'freq'); % Shows magnitude response and group delay
```

The resultant figures are shown in Fig. 1 and 2.