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Designing a High- Pass FIR Digital Filter by Using Bartlett Window and Blackman Window Technique

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Abstract—Theaim of this paper is to design FIR filter of the Window function methods. This paper presents the importance of filter in signal processing. Digital filter are of two types (1)FIR (2)IIR. Design of FIR filer is done in MATLAB. MATLAB programming processes are used to Designing a High- Pass FIR Digital Filter by Using Bartlett Window and Blackman Window Techniquecharacterize the magnitude and phase response Digital filter plays an important role in today's world of communication and computation. Without digital filter we cannot think about proper communication because noise occurs in channel.
Keywords— FIR Digital Filter, Window Function, FDA tool inMATLAB

I. INTRODUCTION

The various techniques for improving the accuracy and reliability of digital communications is known as Digital Signal Processing (DSP). A High Pass Filter rejects the frequency components below the threshold value. A Digital Filter takes a digital input, gives a digital output, and consists of digital components. A Finite Impulse Response (FIR) Filter is a filter structure that can be used to implement almost any sort of frequency response digitally.

II. APPLICATIONS OF DSP

Digital signal processing techniques are used in various areas such as RADAR, SONAR, BIOMEDICAL, SPEECH P ROCESSING, IMAGE PROCESSING, etc.

These techniques are applied analyzing the signal in radar tracking system, linear periodic system, speech synthesizers etc.

III. WINDOW TECHINIQUES

In this method the desired frequency response specification $H_d(e^{j\omega})$ corresponding unit sample response $h_d(n)$ is determined using the following relation

$$H_d(e^{j\omega}) = \sum_{n=-\infty}^{\infty} h_d(n)e^{-j\omega n} \quad \text{...(1)equation}$$

$$h_d[n] = 1/2\pi \int_{-\pi}^{\pi} h_d(e^{j\omega})e^{-j\omega n}d\omega \text{...(2)equation}$$

In given a frequency response specification $H_d(e^{j\omega})$, we can compute $h_d[n]$ from eq.(2) and determine the transfer function $H_d(z)$. For most practical applications, the desired frequency response is piecewise constant with sharp transitions between bands; the corresponding impulse response sequence $\{h_d[n]\}$ is of infinite length and noncausal.

A. Bartlett Window Function

The weighting function for the Bartlett window is given by

$$W_R(n) = \begin{Bmatrix} 1 for\ |n| \leq \frac{M-1}{2} \\ 0,\ otherwise \end{Bmatrix} \quad \text{.............(3) equation}$$

B. Blackman Window Function

The window function of a casual Blackman window is expressed by

$$Wb(n) = \begin{Bmatrix} 0 \leq n \leq M-1 \\ 0,\ otherwise \end{Bmatrix} \quad \text{................(4) equation}$$

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C. Simulation And Result

PARAMETER	VALUES
Sampling Frequency(F_s)	1750
Cut off Frequency(F_c)	350
Order(N)	10

Table1: Parameter Specification

D. Figures and Tables

Filter coefficient h(n)	Window Techniques	
	Bartlett	Blackman
h(0)=h(10)	0	0
h(1) =h(9)	0.015891530047347	0.003043903340
h(2)= h(8)	0.02619068187333	0.012523222453
h(3)= h(7)	0.05892903421500	0.047697662795
h(4)= h(6)	0.25426448075755	0.257129032473
h(5)	0.629927410566876	0.60009589886

Table2: Filter coefficients of Bartlett& Blackman Window Techniques

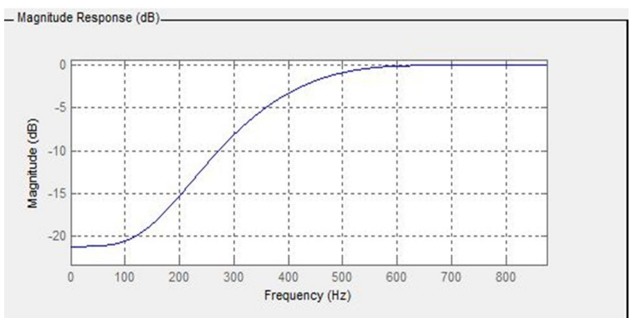

Figure 1: Magnitude Response of Bartlett Window Technique

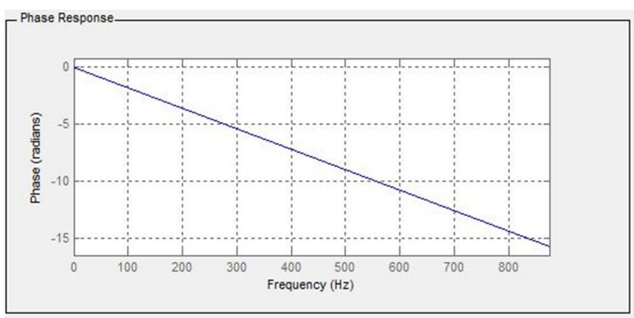

Figure 2: Phase response of Bartlett window technique

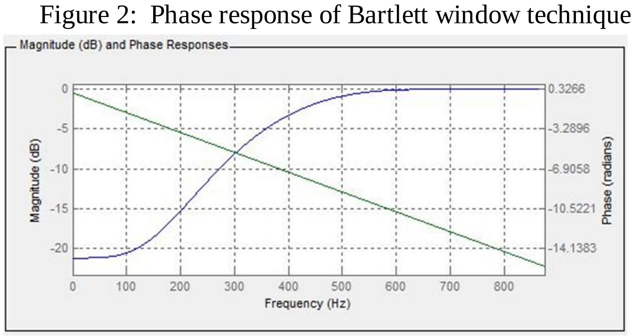

Figure3: Magnitude and phase response of Bartlett window technique

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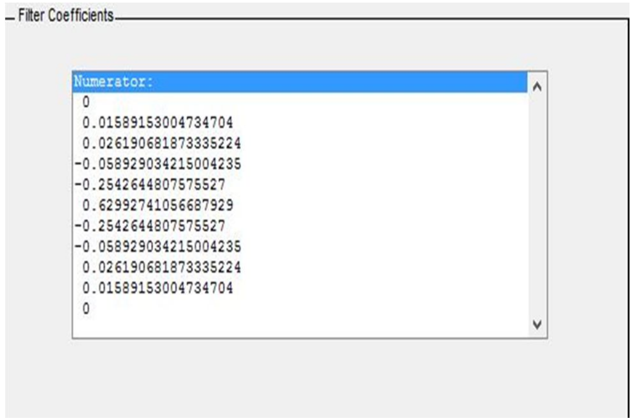

Figure 4: Filter Coefficient of Bartlett Window Technique

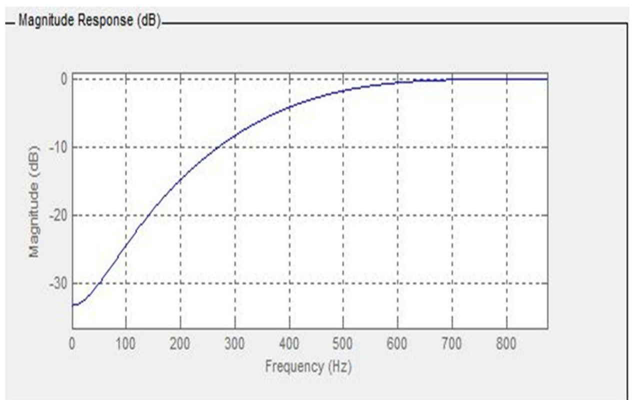

Figure 5: Magnitude Response of Blackman Window Technique

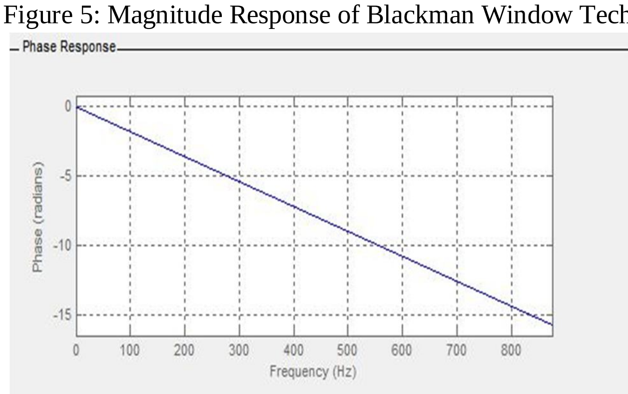

Figure 6: Phase Response of Blackman Window Technique

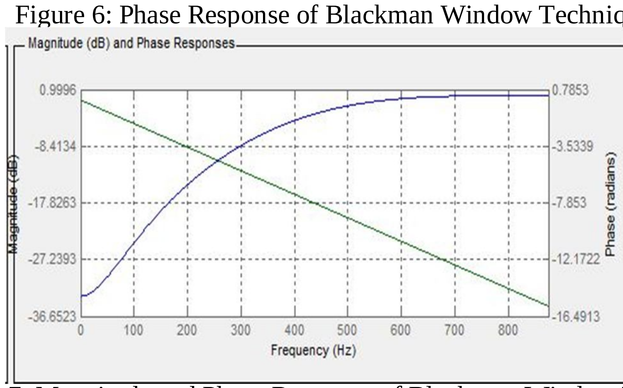

Figure 7: Magnitude and Phase Response of Blackman Window Technique

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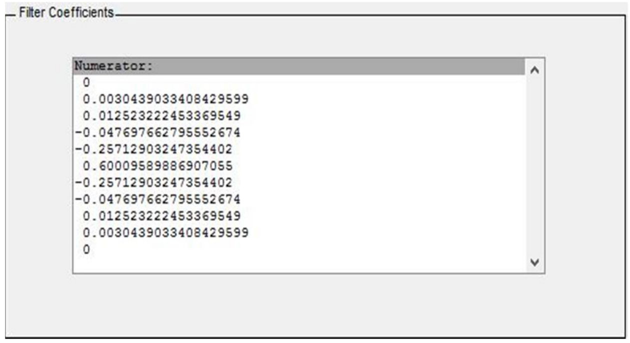

Figure 8: Filter Coefficient of Blackman Window Technique

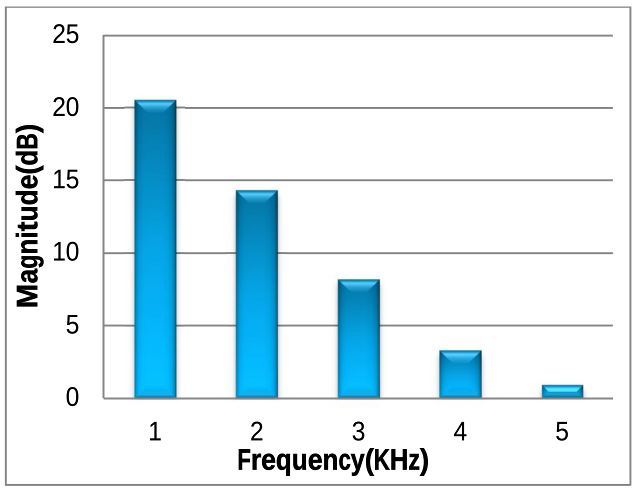

Figure 9:Magnitude and Frequency plot of Bartlett Window Technique

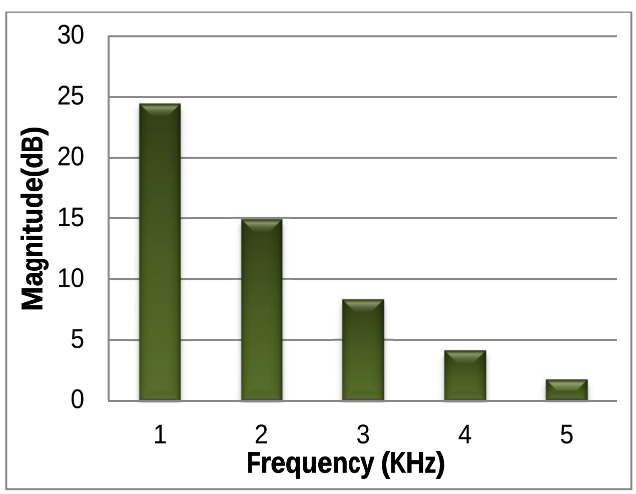

Figure 10:Magnitude and Frequency plot of Blackman Window Technique.

IV. CONCLUSIONS

The proposed design FIR filter using Bartlett and Blackman window technique of order 10. The analyses of magnitude and phase response of proposed FIR high pass filter are performed using MATLAB simulation. Digital filter can play a major role in speech signal processing applications such as, speech filtering, speech enhancement, noise reduction and automatic speech recognition. The

Kaiser window gives the minimum.

V. ACKNOWLEDGMENT

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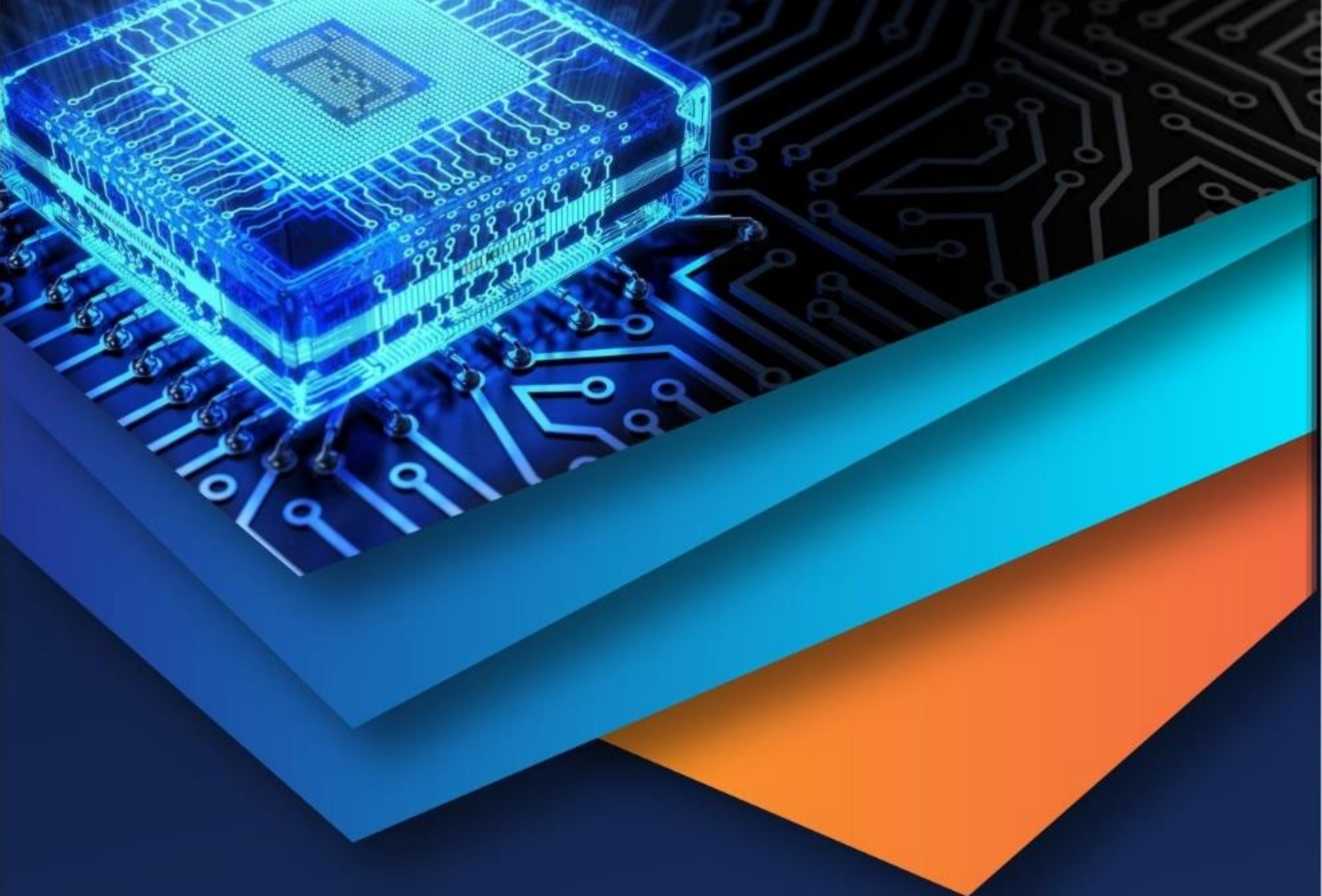

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