

A Review on Finite Impulse Response and Infinite Impulse Response Filter Combined Circuit

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Abstract: Filters are electronic circuits which used in many applications. Basically filters are circuit of linear type. This is work on the principle of removing the noisy signal, interference in input signal and unwanted distortion from the signal. it is widely used in electronics devices and circuits to improve efficiency related to removing noisy signals and unwanted interference and distortion in noisy signals filters are vital parts of electronics devices various types of filters are found in electronics devices which work on the principle of reducing noise in signals and removed unwanted signals from the channels. In this paper we Review FIR and IIR filters with top level architecture of the combined FIR and IIR filters which used in circuit for remove noise in communication devices and improved efficiency.

Keywords: Combined IIR and FIR Filters, FIR, IIR, Adaptive control, speech enhancement, Adaptive Filter, noise reduction

I. INTRODUCTION

Today non renewable energy resources like fossils fuels and other source of energy used vastly with the increasing population of the world. In that circumstance it is a big challenge around us to save the non renewable energy resources like fossils fuels. But after 30 to 40 years it may be depleted completely. But some renewable energy resources like solar energy, wind energy etc. demands increasing day by day. so in near future electricity and electronics devices increases with the increasing world population. Availability of power is very important need. Research in the field of for electrical and electronics devices increased in the future. In those circumstances filters are very important field for research in the future for remove noise in communication devices and improved efficiency.

In this paper we review FIR and IIR filters with top level architecture of the combined FIR and IIR filters which used in circuit for remove noise.[1],[2],[3] Various types of filters are found in electronics. The main works of filters are when from transmitting devices a signal reached to the receiver. In that condition some noisy signal remains in the input signal which may distort the signal or inferior the quality of the signal.

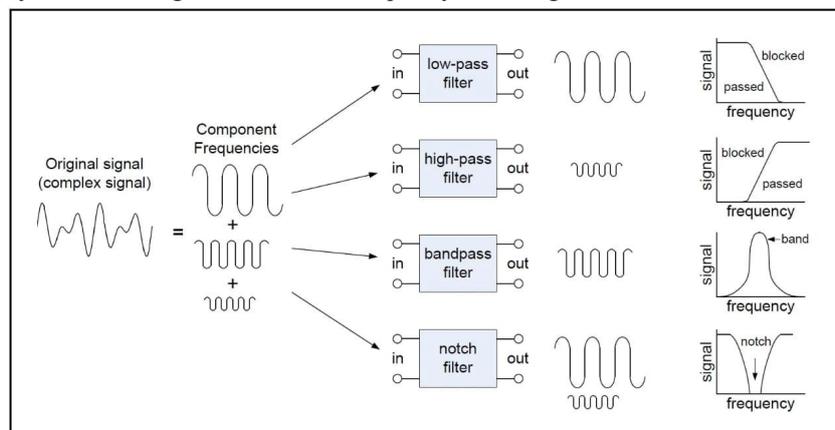


Figure 1: Types of filters

II. RELATED WORKS

In this related we explain briefly about FIR, IIR filters and we implement the IIR and FIR filter combined design. And we briefly explain the working of IIR and FIR filters by working diagram given below,

2.1 FIR Filter

FIR filter zero always settled in finite time. FIR has finite duration compared to IIR. FIR filters are non recursive [4], [5] which means no recursion take place in FIR filters. According to Kronecker delta input let us of an Nth ordering discrete time ends at N+1 terms samples from first non zero element and end through [6],[7],[8] the last nonzero element and before that its settled at zero. In the figure 2 below given that X_n is the input of FIR filter and Y_n is the output of FIR fitters. in figure 2 direct from of discrete time of FIR filter shown in the order of N. in the figure 2 top part is an N stage lines of FIR filter one by one on the other side ends at N+1 taps. Z represents in the figure 2 notation of Z transform [9], [10] and in the given figure each term associates with Z transforms notation. Some of the other characteristics of FIR filter is that there are all zero filters remain in FIR filters FIR filters do not uses any feedback from output due to its non recursive property in FIR filter worked on the linear phase response. FIR filters are less stable compared to IIR filters due to its finite impulse response principal more numbers of multiplications are required in FIR filters as compared to IIR filters. FIR filter more memory required to FIR filter as compares to IIR filter and the complexity level of FIR filter is less as compares to IIR filter. FIR filters cannot simulate prototype analog filters. In FIR filter design Fourier series method, windowing techniques and frequency sampling method are widely used.

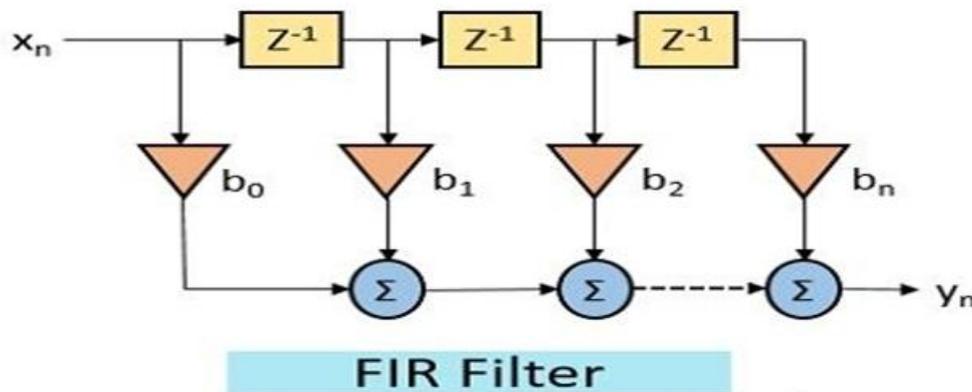


Figure 2: FIR filters

2.2 IIR Filter

IIR filter is worked on the principle of infinite impulse response filter which is an very important property of IIR filter. [11] In the figure 3 X_n is the input signal of IIR filter. And Y_n is the output of IIR filters. let us of an Nth ordering discrete time ends at N+1 terms samples from first non zero element and end through the last nonzero element and before that its settled at zero.[12],[13],[14] Z represents in the figure 2 notation of Z transform and in the given figure each term associates with Z transforms notation. Due to its infinite duration in IIR filter poles and zero both represents some its filters are designed by taking all pole filters. Due to these filters recursive property in IIR filters used feedback from output opposite to FIR filters. Due to IIR filters recursive property IIR filters shows non linear phase response. [15], [16],[17] The main characteristics of IIR filters are stability.IIR filters are more stable compared to FIR filters. IN IIR filters less number of multiplications required as compared to FIR filters. Due to IIR filter infinite impulse response property its required less memory as compared to FIR filters. Important property of IIR filter is that IIR filter can simulate prototype analog filters. [18],[19],[20] IIR filters required lower order filters. In IIR filters various design method are used as like approximation of derivatives, matched z transform, impulse invariant method or bilinear transformation. IIR filters are used where minimum order is required mostly used in sharp cut off properties.

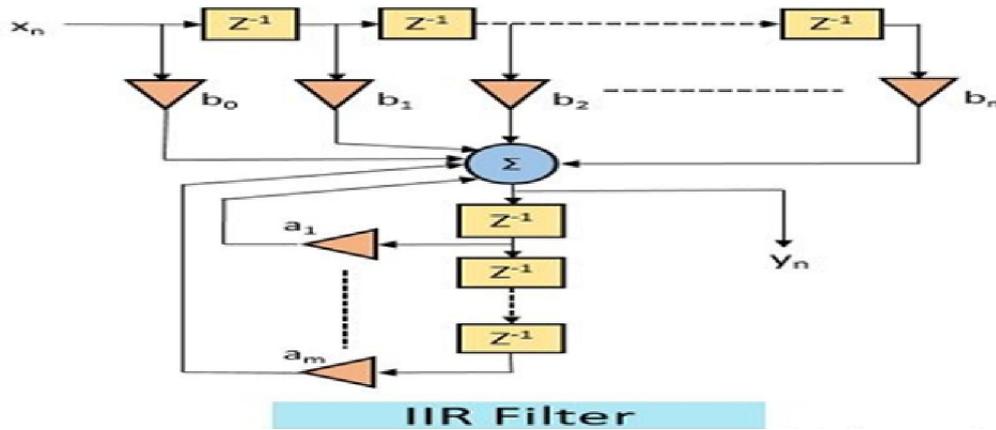


Figure 3: IIR filters

2.3 IIR and FIR Filter Combined Circuit

A method using integrated control of IIR and FIR filters is shown in Figure 4. The main control function is programmable according to current and voltage harmonic compensation along with improvement of power quality with satisfactory day and performance with DistCom function. [21], [22] In addition, performance under poor network conditions is tested by reducing the harmonics of network currents (isa, isb, isc) in the IEEE-519 standard.

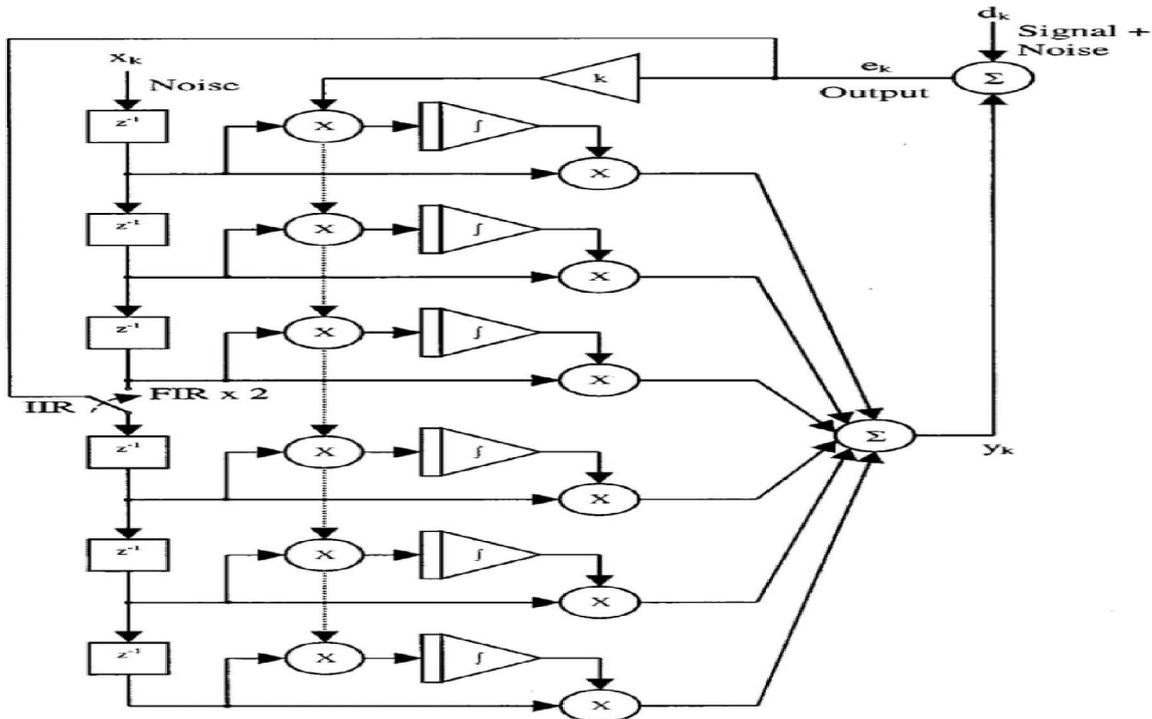


Figure 4: IIR and FIR filters combined circuit

III. CONCLUSION

In this work, the performance of the control based on the combined IIR and FIR filter was tested, and the satisfactory results confirm its effectiveness, especially in the weak phase. It was effective in reducing harmonics due to its effective control behaviour and quick decision-making ability. In addition, reduction of computational load and cost are some advantages of implementing integrated control based on IIR and FIR filters, since its implementation for using that multi objective control has not been investigated before. Therefore, its application has been studied and implemented in many conditions such as voltage drop, swelling load reduction and insulation change with effective extraction of the main load components.

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