ABSTRACT

The two major operations are accomplished in consumer electronics and communication engineering. The process of reducing the sampling frequency of a sampled signal is called decimation. While using the decimating filters, only a portion of the out-of-pass band frequencies aliases into the pass band, in systems wherein different parts operate at different sample rates. A filter design, tuned to the aliasing frequencies all of which can otherwise stealth into the pass band, not only provides multiple stop bands but also exhibits computational efficiency and performance superiority over the single stop band design. The proposed method of transmultiplexer using decimation and interpolation filters analysis procedure is very efficient and it also open up a new vista of simplicity and elegancy to compute for the desired over and above transmultiplexer.

The technology of using comb filters for FIR Decimation in digital signal processing, the process of decreasing the sampling frequency of a sampled signal is called decimation. These filters are referred to as multiband designs in the family of FIR filters. The other two special versions of FIR filter designs are Halfband and Comb filter designs, which are particularly useful for reducing the computational requirements in multirate designs. The proposed method of using Comb FIR decimation procedure is not only efficient but also offers simplicity and elegancy to compute Multiplications per Second (MPS) and Additions per Second (APS) for the desired filter over and above the half band designs.

Decimation filters are used to reduce the sampling rate of the input sampled signal by down sampling. In many digital communication systems, it is required to decimate the signal by an arbitrary factor. The Farrow structure provides an efficient way to implement the decimation filter using polynomial approximation method for arbitrary sample rate change. A lower order cubic polynomial approximation method for decimation gives exact reconstruction of

the new decimated signal as the input sampled signal. The cubic polynomial approximation method has been used to implement Farrow structure based decimator. The optimum filter coefficients have been calculated using cubic polynomials. The proposed design approximates the realization of characteristics of brick wall filters. Aliasing effect, propagation delay are rectified by transmultiplexer. Performance of transmultiplexer using down sampling and up sampling is superior to comb filter.