World Academy of Science, Engineering and Technology
International Journal of Electronics and Communication Engineering
Vol:8, No:09, 2014

Design of Decimation Filter Using Cascade Structure for Sigma Delta ADC

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Abstract : The oversampled output of a sigma-delta modulator is decimated to Nyquist sampling rate by decimation filters. The decimation filters work twofold; they decimate the sampling rate by a factor of OSR (oversampling rate) and they remove the out band quantization noise resulting in an increase in resolution. The speed, area and power consumption of oversampled converter are governed largely by decimation filters in sigma-delta A/D converters. The scope of the work is to design a decimation filter for sigma-delta ADC and simulation using MATLAB. The decimation filter structure is based on cascaded-integrated comb (CIC) filter. A second decimation filter is using CIC for large rate change and cascaded FIR filters, for small rate changes, to improve the frequency response. The proposed structure is even more hardware efficient.

Keywords : sigma delta modulator, CIC filter, decimation filter, compensation filter, noise shaping
Conference Title : ICCSP 2014 : International Conference on Communications and Signal Processing
Conference Location : Los Angeles, United States
Conference Dates : September 29-30, 2014