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Design of Wide-Range Variable Fractional-Delay FIR Digital Filters

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Abstract : In this paper, design of wide-range variable fractional-delay (WR-VFD) finite impulse response (FIR) digital filters is proposed. With respect to the conventional VFD filter which is designed such that its delay is adjustable within one unit, the proposed VFD FIR filter is designed such that its delay can be tunable within a wider range. By the traces of coefficients of the fractional-delay FIR filter, it is found that the conventional method of polynomial substitution for filter coefficients no longer satisfies the design demand, and the circuits perform the sinc function (sinc converter) are added to overcome this problem. In this paper, least-squares method is adopted to design WR-VFD FIR filter. Throughout this paper, several examples will be proposed to demonstrate the effectiveness of the presented methods.

Keywords : digital filter, FIR filter, variable fractional-delay (VFD) filter, least-squares approximation
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