ADJUSTABLE FRACTIONAL ORDER DIFFERENTIATOR

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Abstract : This paper deals with the design of digital adjustable fractional order differentiator approximation of the fractional order differentiator sm, for $0 < m < 1$, in a given frequency band of interest. First, closed form digital infinite impulse response (IIR) adjustable fractional order differentiator is obtained based on an analog adjustable fractional order differentiator. Then, closed form digital finite impulse response (FIR) adjustable fractional order differentiator is derived from the digital IIR one. In both cases, the digital differentiator can be implemented by the digital Farrow structure. Finally, a numerical example is presented to illustrate the efficiency and the effectiveness of the proposed design method.

Keywords : Fractional order differentiator, Digital IIR filters, Digital RIF filters, Farrow structure