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APPROXIMATION OF THE HILBERT TRANSFORM VIA USE OF SINC CONVOLUTION*

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Abstract. This paper derives a novel method of approximating the Hilbert transform by the use of sinc convolution. The proposed method may be used to approximate the Hilbert transform over any subinterval Γ of the real line $\mathbb{R} \equiv (-\infty, \infty)$, which means the interval Γ may be a finite or semi-infinite interval, or the entire real line $\mathbb{R}$. Given a column vector $\boldsymbol{f}$ consisting of m values of a function f defined on m sinc points of Γ, we obtain a column vector $\boldsymbol{g} = \boldsymbol{A}\boldsymbol{f}$ whose entries approximate the Hilbert transform on the same set of m sinc points. The present paper describes an explicit method for the construction of such a matrix $\boldsymbol{A}$.

Key words. sinc methods, Hilbert transform, Cauchy principal value integral

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