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SPARSE SIGNAL RECONSTRUCTION USING REFINED INSTANTANEOUS FREQUENCY ESTIMATION

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Abstract:

Quadrature is a significant area in approximation theory with broad applications in mathematics and engineering. This paper presents a new numerical quadrature scheme for the Riemann-Stieltjes integral, using a four-point Simpson's rule with a midpoint derivative. The scheme is derived in both basic and composite forms, and theorems for local and global error terms are proven. The proposed scheme is validated by reducing it to the corresponding Riemann-integral scheme and confirmed through numerical experiments. MATLAB was used for the computational validation, and the performance of the proposed scheme was compared with four existing derivative-free and derivative-based schemes. The results demonstrate that the proposed scheme outperforms the others in terms of absolute error reduction, computational cost and execution time.

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