

A NEW WAY TO CALCULATE THE SINE INTEGRAL FUNCTION

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ABSTRACT. The sine integral function appears when working with band-limited functions. In digital signal processing it is used for representing the Gibb's phenomenon and ideal low pass filters. Recently, it also found applications in quantum theory and during computation of least square slant-stack transforms, also referred to as tau-p transform, of band-limited data. Considering the wide applications of the tau-p transform in geophysics and medical imaging, calculation of the sine integral function is essential. In this note, we present a new method to calculate the sine integral function. Our method is based on an accurate representation of the sinc function as a sum of scaled cosines within an interval of interest. For a given interval, the computational cost of the proposed method is linear with the respect to the number of evaluation points times number of cosines used in representing the sinc function. We compare the proposed method with MATLAB's symbolic toolbox's sine integral function implementation, `sinint`. The proposed method is as accurate as `sinint`.

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