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In mathematics, the Prolate spheroidal wave functions (PSWF) are a set of orthogonal bandlimited functions. They are eigenfunctions of a timelimiting operation followed by a lowpassing operation.

Prolate spheroidal wave function - Wikipedia
of prolate spheroidal wave functions (PSWF) in the form of a new orthogonal expansion which we have named the Slepian series. We empirically show that the Slepian series is potentially optimal over more conventional orthogonal expansions for discontinuous functions such as the square wave among others. With regards to interpolation, we

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Prolate spheroidal wave functions, an introduction to the ...

Prolate Spheroidal Wave Functions of Order Zero: Mathematical Tools for Bandlimited Approximation (Applied Mathematical Sciences Book 187) eBook: Andrei Osipov, Vladimir Rokhlin, Hong Xiao: Amazon.co.uk: Kindle Store

Prolate Spheroidal Wave Functions of Order Zero ...

Prolate spheroidal wave functions, fourier analysis and uncertainty — I. Abstract: A complete set of bandlimited functions is described which possesses the curious property of being orthogonal over a given finite interval as well as over $(-\infty, \infty)$. Properties of the functions are derived and several applications to the representation of signals are made.

Prolate spheroidal wave functions, fourier analysis and ...

The present paper finds a new kind of quaternionic signals whose energy concentration is maximal in both time and frequency under the quaternionic Fourier transform. The new signals are a generalization of the classical prolate spheroidal wave functions to a quaternionic space, which are called the quaternionic prolate spheroidal wave functions.

Prolate spheroidal wave functions associated with the ...

Cuiming Zou, Kit Ian Kou, Joao Morais, Prolate spheroidal wave functions associated with the quaternionic Fourier transform, Mathematical Methods in the Applied Sciences, 10.1002/mma.4439, 41, 11, (4003-4020), (2017).

Prolate Spheroidal Wave Functions, Fourier Analysis and ...

Abstract: A discrete time series has associated with it an amplitude spectrum which is a periodic function of frequency. This paper investigates the extent to which a time series can be concentrated on a finite index set and also have its spectrum concentrated on a subinterval of the fundamental period of the spectrum. Key to the analysis are certain sequences, called discrete prolate spheroidal sequences, and certain functions of frequency called discrete prolate spheroidal functions.

Prolate spheroidal wave functions, fourier analysis, and ...

Abstract| For fixed c ; the Prolate Spheroidal Wave Functions (PSWFs) $p_n(c)$ form a basis with remarkable properties for the space of band-limited functions with bandwidth c . They have been largely studied and used after the seminal work of D. Slepian, H. Landau and H. Pollack. Recently,

Spheroidal Wave Functions. - arxiv.org

As demonstrated by Slepian et al. in a sequence of classical papers (see Slepian (1983) , Slepian and Pollak (1961) , Landau and Pollak (1961) , Slepian and Pollak (1964) , Slepian (1965)), prolate spheroidal wave functions (PSWFs) provide a natural and efficient tool for computing with bandlimited functions defined on an interval. Recently, PSWFs have been becoming increasingly popular in various areas in which such functions occur – this includes physics (e.g. wave phenomena, fluid ...

On the evaluation of prolate spheroidal wave functions and ...

30.13 Wave Equation in Prolate Spheroidal Coordinates; 30.14 Wave Equation in Oblate Spheroidal Coordinates; 30.15 Signal Analysis; Computation. 30.16 Methods of Computation; 30.17 Tables; 30.18 Software

DLMF: 30 Spheroidal Wave Functions

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Spheroidal wave functions are solutions of the Helmholtz equation that are found by writing the equation in spheroidal coordinates and applying the technique of separation of variables, just like the use of spherical coordinates lead to spherical harmonics. They are called oblate spheroidal wave functions if oblate spheroidal coordinates are used and prolate spheroidal wave functions if prolate spheroidal coordinates are used.

Spheroidal wave function - Wikipedia

The new signals are a generalization of the prolate spheroidal wave functions (also known as Slepian functions) to quaternionic space, which are called quaternionic prolate spheroidal wave functions.

Prolate Spheroidal Wave Functions Associated with the ...

GENERALIZED PROLATE SPHEROIDAL WAVE FUNCTIONS 107 Hence we have defined $A_{k,j}(a, t_i, n)$ to be zero if $|k| > 2j$ or $k < -1$ or $k = 0$ and $j = 0$. Besides this we have $A_{m'}(a, t_i, n) = 0$ if $m \neq 0$, $A_0(a, t_i, n) = 1$, $A_0(a, [3, n]) = 0$. The eigen values and eigenfunctions for eq. (1.1) have been given, below

Generalized prolate spheroidal wave functions

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Prolate Spheroidal Wave Functions of Order Zero ...

Prolate spheroidal wave functions (PSWFs) give a very convenient basis for representing and manipulating bandlimited functions restricted to a compact domain D . The 1D case, in which D is an interval, is investigated in [3,5,6].

Prolate spheroidal wave functions on a disc—Integration ...

Prolate Spheroidal Wave Function The wave equation in prolate spheroidal coordinates is (1) where (2) Substitute in a trial solution (3) (4) The radial differential equation is (5) and the angular differential equation is (6) Note that these are identical (except for a sign change). The prolate angular function of the first kind is given by

Prolate Spheroidal Wave Function : Definition & Problems ...

A system of linear prolate spheroidal functions is used for the parametrization of processing of small-angle scattering (SAS) data in the application for monodisperse systems.

(PDF) Prolate radial spheroidal wave functions

In this study, a new approach for deriving ACFs from measurements is proposed by introducing the Prolate Spheroidal Wave Functions (PSWF). PSWF can be used in two ways: fitting the measured response itself or fitting the sample ACF from the measurements.

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