numrec

miscellaneous "numerical" routines

contents

1.1 Outline

This file contains various miscellaneous "numerical" routines as described below.

1.2 gi00ab

1. This routine assigns the Fourier mode labels that converts a double-sum into a single sum; i.e., the m_j and n_j are assigned where

$$f(\theta, \zeta) = \sum_{n=0}^{N} f_{0,n} \cos(-n\, N_P\, \zeta) + \sum_{m=1}^{M} \sum_{n=-N}^{N} f_{m,n} \cos(m\theta - n\, N_P\, \zeta) \tag{1}$$

$$= \sum_{j} f_j \cos(m_j\theta - n_j\zeta), \tag{2}$$

where $N \equiv \mathtt{Ntor}$ and $M \equiv \mathtt{Mpol}$ are given on input, and $N_P \equiv \mathtt{Nfp}$ is the field periodicity.

1.3 tfft

1. This constructs the "forward" Fourier transform.

2. Given a set of data, (f_i, g_i) for $i = 1, \ldots N_\theta N_\zeta$, on a regular two-dimensional angle grid, where $\theta_j = 2\pi j/N_\theta$ for $j = 0, N_\theta - 1$, and $\zeta_k = 2\pi k/N_\zeta$ for $k = 0, N_\zeta - 1$. The "packing" is governed by $i = 1 + j + kN_\theta$. The "discrete" resolution is $N_\theta \equiv \mathtt{Nt}$, $N_\zeta \equiv \mathtt{Nz}$ and $\mathtt{Ntz} = \mathtt{Nt} \times \mathtt{Nz}$, which are set in preset.

3. The Fourier harmonics consistent with Eqn.(2) are constructed. The mode identification labels appearing in Eqn.(2) are $m_j \equiv \mathtt{im(j)}$ and $n_j \equiv \mathtt{in(j)}$, which are set in global via a call to gi00ab.

1.4 invfft

1. Given the Fourier harmonics, the data on a regular angular grid are constructed.

2. This is the inverse routine to tfft.

1.5 gauleg

1. Compute Gaussian integration weights and abscissae.

2. From Numerical Recipes.