numrec

miscellaneous "numerical" routines

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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

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

$$= \sum_{j} f_{j} \cos(m_{j}\theta - n_{j}\zeta), \tag{2}$$

where $N \equiv \text{Ntor}$ and $M \equiv \text{Mpol}$ are given on input, and $N_P \equiv \text{Nfp}$ 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 $i = 1, \dots N_\theta N_\zeta$, 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 $N_\theta \equiv \text{Nt}$, $N_\zeta \equiv \text{Nz}$ and $\text{Ntz} = \text{Nt} \times \text{Nz}$, which are set in preset.
- 3. The Fourier harmonics consistent with Eqn.(2) are constructed. The mode identification labels appearing in Eqn.(2) are $m_j \equiv \text{im}(j)$ and $n_j \equiv \text{in}(j)$, 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.

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SPEC subroutines;