NAME

HT − NMRPipe Hilbert Transform

SYNOPSIS

nmrPipe −fn HT [**−ps90−180 | −ps0−0 | −auto**] [**−nozf | −zf**]

DESCRIPTION

HT applies a Hilbert transform, which reconstructs the imaginary part of a given spectrum to create a complex result from a real imput. It leaves the real part of the data unchanged. The HT is commonly used in cases where the imaginary data have been deleted during previous processing, but the data must be re−phased or inverse−processed.

In order to reconstruct imaginary data properly, the data must have been at least doubled in size by zero filling during previous Fourier processing. In addition, if the data previously required substantial first−order phase correction (for instance because of a substantial acquisition delay) the HT will generate results which are distorted at the edges. However, if the acquisition delay was set to 1/2−dwell (P1=180), this problem can be avoided by a mirror−image implementation of the HT.

OPTIONS

−ps90−180
: This flag enables a mirror−image implementation of the HT suitable for data with a 1/2−dwell acquisition delay.

−zf This flag enables use of temporary zero−filling to increase the speed of the HT. This option can only be used for the ordinary HT.

−auto This flag enables automatic selection of the HT type and the temporary zero−fill mode. If the given dimension has a recorded first−order phase of 180.0, and if it is not an extracted region, mirror−image HT with no temporary zero−fill will be selected. Otherwise, an ordinary HT will be used with temporary zero−fill enabled.

−ps0−0 This flag forces use of an ordinary HT. It is used to override automatic settings from the **−auto** option.

−nozf This flag suppresses use of a temporary zero fill. It is used to override automatic settings from the **−auto** option.

EXAMPLES

The following scheme demonstrates the HT used to reconstruct imaginary data so that the X−Axis of the given 2D spectrum can be rephased:

```
nmrPipe −in test.ft2              \
| nmrPipe −fn HT −auto            \
| nmrPipe −fn PS −p0 90 −p1 0 −di \
   −out test.ft2 −inPlace −verb
```

The following scheme demonstrates the HT used to reconstruct imaginary data so that the Y−Axis of the given 2D spectrum can be rephased:

```
nmrPipe −in test.ft2              \
| nmrPipe −fn TP                  \
| nmrPipe −fn HT −auto            \
| nmrPipe −fn PS −p0 90 −p1 0 −di \
   −out test.ft2 −inPlace −verb
```

The following is a general 2D inverse Fourier transform scheme, which will regenerate a 2D hypercomplex FID from a real–only 2D spectrum. Note use of the generic **nmrPipe** option **–ad** to make room for hypercomplex data, and the use of the hypercomplex transpose option **TP –hyper**:

```
nmrPipe –in test.ft2             \
| nmrPipe –fn HT –auto –verb     \
| nmrPipe –fn PS –inv –hdr       \
| nmrPipe –fn FT –inv            \
| nmrPipe –fn ZF –inv            \
| nmrPipe –fn APOD –inv –hdr –ad \
| nmrPipe –fn TP –hyper          \
| nmrPipe –fn HT –auto –verb     \
| nmrPipe –fn PS –inv –hdr       \
| nmrPipe –fn FT –inv            \
| nmrPipe –fn ZF –inv            \
| nmrPipe –fn APOD –inv –hdr     \
   –out test.fid –ov
```

BUGS

The HT will change the data type automatically to create complex data from all–real data, but it will not automatically create hypercomplex data from complex data.