

# General rules and conventions for Snag

## Signal processing

### Spectra

The spectra are bilateral.

### Fourier transform

## Time and astronomy

### Time

The time is in MJD (Modified Julian Date), defined as

$$\text{MJD} = \text{JD} - 2400000.5$$

This is easily related to the usual time expression (year, month, day, hour, minute, second) and to the way astronomers express absolute time.

For particular cases, when uniform time is needed, (for example for precise time duration), TAI or GPS time can be used, but it must be converted for many functions.

### Sidereal hour

Normally the Greenwich sidereal hour is used. It should be expressed in hours (preferably) or in degrees.

Given below is a simple algorithm for computing apparent sidereal time to an accuracy of about 0.1 second, equivalent to about 1.5 arcseconds on the sky. The input time required by the algorithm is represented as a Julian date ([Julian dates](#) can be used to determine [Universal Time](#).)

Let JD be the Julian date of the time of interest. Let  $\text{JD}_0$  be the Julian date of the previous midnight (0<sup>h</sup>) UT (the value of  $\text{JD}_0$  will end in .5 exactly), and let H be the hours of UT elapsed since that time. Thus we have  $\text{JD} = \text{JD}_0 + \text{H}/24$ .

For both of these Julian dates, compute the number of days and fraction (+ or -) from 2000 January 1, 12<sup>h</sup> UT, Julian date 2451545.0:

$$D = JD - 2451545.0$$

$$D_0 = JD_0 - 2451545.0$$

Then the Greenwich mean sidereal time in hours is

$$GMST = 6.697374558 + 0.06570982441908 D_0 + 1.00273790935 H + 0.000026 T^2$$

where  $T = D/36525$  is the number of *centuries* since the year 2000; thus the last term can be omitted in most applications. It will be necessary to reduce GMST to the range 0<sup>h</sup> to 24<sup>h</sup>. Setting  $H = 0$  in the above formula yields the Greenwich mean sidereal time at 0<sup>h</sup> UT, which is tabulated in *The Astronomical Almanac*.

The following alternative formula can be used with a loss of precision of 0.1 second per century:

$$GMST = 18.697374558 + 24.06570982441908 D$$

where, as above, GMST must be reduced to the range 0<sup>h</sup> to 24<sup>h</sup>. The equations for GMST given above are adapted from those given in Appendix A of *USNO Circular No. 163* (1981).

Here is another formula:

L'Union Astronomique Internationale a défini la valeur du Temps Sidéral *Moyen* au méridien de Greenwich à 00h UT d'un jour donné par la formule suivante :

$$GTSM0 = 6h\ 41m\ 50,54841s + 8640184s,812866 T + 0\ s,093104 T^2 - 0\ s,0000062 T^3$$

où T s'exprime par :

$$T = (J J - 2451545,0) / 36525$$

Le Jour Julien pour ce jour à 00h se calcule par les formules données [ailleurs](#).

Si vous préférez les degrés l'expression devient :

$$GTSM0 (^\circ) = 100,46061837 + 36000,770053608 T + 0,000387933 T^2 - T^3 / 38710000$$

## **Longitude**

The longitude is measured eastward, so negative longitude means "west" (counterclockwise around Earth axis).

## **Azimuth**

Azimuth is measured from south toward west (clockwise around the vertical axis).