MAKET

February 2, 2006

1 PURPOSE:

MAKET enables the user to construct the following kinds of time series:

1. Sinecurve;
2. Ramp (or linear) function;
3. Random noise with a gaussian distribution;
4. Random noise with a uniform distribution.

and/or sinecurve or ramp with superposed with gaussian or uniform noise respectively.

Each user-selected series is constructed according to the user-specified number of terms (NUM), start time (FIRST), and term time (or space) interval (RINC)).

1. The Sine wave time series, $S_t$, is generated according to:

$$S_t = a \sin \left( \frac{2\pi t}{T} + \phi \right),$$

where

$a$ – user-supplied sine wave amplitude,
$T$ – user-supplied sine wave period (in units of the series time (or space)interval),
$\phi$ – user-supplied phase of sine wave (expressed as a fraction of the period),
$t$ – time (or distance) of successive discrete terms [e.g. $t = \text{FIRST}, \text{FIRST} + \text{RINC}, \text{FIRST} + (2 \cdot \text{RINC}), \ldots, \text{FIRST} + (\text{NUM} - 1) \cdot \text{RINC}]$. 

1
All of the above parameters are specified by the user.

2. The Ramp time series, $r_t$, is generated using:

$$r_t = a + bt,$$

where

- $a$ – user-supplied initial value at start time,
- $b$ – user-supplied slope of the ramp OR series end term value,
- $t$ – time (or distance) of successive discrete terms [e.g. $t = 0, 1, 2, 3, \ldots, \text{NUM}$].

3. The Gaussian series, or noise, $g_t$, is generated using:

$$g_t = \sigma \times r_t,$$

where

- $\sigma$ – user-specified standard deviation of the Gaussian distribution.
- $r_t$ – is a pseudo-random number from a normal distribution with a mean of zero and a standard deviation of one. These values are returned from the function GRAN. For details on this numerical subroutine, refer to CACM 17, 1974, p. 706 or Algorithm # 488.

NOTE !!!: The program generates the same “random series” with the first call to MAKET. Therefore to obtain different noise series, generate all of them during the same call to MAKET.

4. The Uniform series or noise, $V_t$, is generated using:

$$V_t = d \times (2 \times q_t - 1),$$

where

- $d$ – user-specified upper bound of the uniform distribution, which is centered on zero.
- $q_t$ – pseudo-random number from a uniform distribution with limits of (0,1). These values are returned from the random numbers generator present in FORTRAN.
2 EXECUTION:

Launch program by entering -

maket (or l-maket)

MAKET:  (DAT)  (TIME)  
LAST UPDATE: (DATE) 

Are you using a parameter file y/n? - enter y or n

Name of output file?

- enter filename [ or '&&']
to exit program].

Enter num, first, and rinc

- enter series number of terms, start time, and term time interval

Sinecurve y/n?

(If y)
What is the phase, period, and amplitude?
express phase as a fraction of the period.

- enter phase, period, and amplitude.

Do you want noise in the sinecurve y/n?

- enter Y or N as desired.

(If y to noise on sine curve, then)
Enter 1 - to generate gaussian noise
   2 - to generate uniform noise

- enter 1 or 2.

(If 1)
What is the standard deviation ?

- enter the standard deviation of the noise.
(If 2)
ENTER UPPER BOUND (0 indicates $\pi$)
- enter the upper bound or zero if you want the
distribution to have limits of (+ and $-\pi$).

**If n to noise on sine curve or at the end of
the specification of the noise, the file header
is printed out.

NAME OF OUTPUT FILE
- enter file name to start new cycle of the program
or two dollar signs ($\$$) to stop the program.

(If n to sinecurve, then)
Do you wish a ramp? y/n
- enter y or n

(If y)
INPUT Y-START, Y-END, Y-INC.
- enter the initial value (Y-START), the end value (Y-END), or the value increment per term (Y-END or Y-INC is given as zero, then the program will
generate the series using the non-zero input.

Do you want noise on the ramp? y/n
- enter y or n

(If y for noise on ramp , then)
Enter 1 - to generate gaussian noise
   2 - to generate uniform noise
- enter 1 or 2.

(If 1)
What is the standard deviation ?
- enter the standard deviation of the noise.
ENTER UPPER BOUND (0 indicates π)

- enter the upper bound or zero if you want the
distribution to have limits of (+ and −π).

3 OUTPUT:

An OCEAN FORMAT file with the user-specified name is output to disk.