Package 'rngWELL'

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Type Package

Title Toolbox for WELL Random Number Generators

Version 0.10-6

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Description It is a dedicated package to WELL pseudo random generators, which were introduced in Panneton et al. (2006), ``Improved Long-Period Generators Based on Linear Recurrences Modulo 2'', ACM Transactions on Mathematical Software. But this package is not intended to be used directly, you are strongly __encouraged__ to use the 'randtoolbox' package, which depends on this package.

Depends R (>= 3.0.0)

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R topics documented:

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pseudo.rngWELL   *Toolbox for pseudo and quasi random number generation*

Description

General linear congruential generators such as Park Miller sequence, generalized feedback shift register such as SF-Mersenne Twister algorithm and WELL generator; and a quasi random generator (pseudo random generators) and the Torus algorithm (quasi random generation).

Usage

```
WELL2test(n, dim = 1, order = 512, temper = FALSE, version = "a")
setSeed4WELL(seed)

doinitMT2002(seed, n, state)
doputRngWELL(order, version, state)
dogetRngWELL(order, version, state)
```

Arguments

`n`	number of observations. If length(n) > 1, the length is taken to be the required number.
`dim`	dimension of observations (must be <=100 000, default 1).
`seed`	a single value, interpreted as a positive integer for the seed. e.g. append your day, your month and your year of birth.
`order`	a positive integer for the order of the characteristic polynomial. see details
`temper`	a logical if you want to do a tempering stage. see details
`version`	a character either "a","b" or "c". see details
`state`	the state as output of `putRngWELL`, `getRngWELL`.

Details

The currently available generator are given below.

WELL generator: The WELL (which stands for Well Equidistributed Long-period Linear) is in a sentence a generator with better equidistribution than Mersenne Twister algorithm but this gain of quality has to be paid by a slight higher cost of time. See Panneton et al. (2006) for details.

The `order` argument of `WELL` generator is the order of the characteristic polynomial, which is denoted by k in Paneton F., L'Ecuyer P. and Matsumoto M. (2006). Possible values for `order` are 512, 521, 607, 1024 where no tempering are needed (thus possible). Order can also be 800, 19937, 21071, 23209, 44497 where a tempering stage is possible through the `temper` argument. Furthermore a possible 'b' version of WELL RNGs are possible for the following order 521, 607, 1024, 800, 19937, 23209 with the `version` argument.

All the C code for WELL generator used in this package is the code of P. L'Ecuyer (cf. http://www.iro.umontreal.ca/~lecuyer/), except some C code, we add, to *interface* with R.

See the pdf vignette for details.

Value

`WELL2test` generates random variables in [0,1[. It returns a nxdim matrix, when `dim>1` otherwise a vector of length n.

`setSeed4WELL` set the seed of the `rngWELL` package (i.e. for the `WELL2test` functions).

Author(s)

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References

Paneton F., L'Ecuyer P. and Matsumoto M. (2006), *Improved Long-Period Generators Based on Linear Recurrences Modulo 2*, ACM Transactions on Mathematical Software. (preprint available online)

See Also

`.Random.seed` for what is done in R about random number generation.

Examples

```
# (1) WELL generator
#

# 'basic' calls
# WELL512
WELL2test(10, order = 512)
# WELL1024
WELL2test(10, order = 1024)
# WELL19937
WELL2test(10, order = 19937)
# WELL44497
WELL2test(10, order = 44497)
# WELL19937 with tempering
WELL2test(10, order = 19937, temper = TRUE)
# WELL44497 with tempering
WELL2test(10, order = 44497, temper = TRUE)

# tempering vs no tempering
setSeed4WELL(08082008)
WELL2test(10, order =19937)
setSeed4WELL(08082008)
WELL2test(10, order =19937, temper=TRUE)


# (2) other tests
#
doinitMT2002(1, 10, 10)
```

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