



[gpu_g05 Chapter Contents](#)
[gpu_g05 Chapter Introduction](#)
[NAG Numerical Routines for GPUs - Manual](#)

NAG Numerical Routines for GPUs - Function Document

nag_gpu_mrg32k3a_exponential

+ Contents

1 Purpose

nag_gpu_mrg32k3a_exponential generates n values x_i from an exponential distribution with mean 1.0.

The initialization function [nag_gpu_mrg32k3a_init](#) must be called prior to the first call to **nag_gpu_mrg32k3a_exponential**.

2 Specification

```
template <class FP>
```

```
void nag_gpu_mrg32k3a_exponential (int nb, int nt, int np, FP x[])
```

3 Arguments

- 1: **nb** – int *Input*
On entry: the number of GPU blocks.
Constraint: $1 \leq nb$.
- 2: **nt** – int *Input*
On entry: the number of GPU threads per block. When $nt=1$, the ordering of the output values, x_i is identical to the standard sequential storage and a default value of **nt** is chosen internally for efficient execution. For other choices of **nt** the ordering is chosen for efficient use of bandwidth and storage and it is recommended that **nt** is set to a multiple of 64.
Constraint: $1 \leq nt$.
- 3: **np** – int *Input*
On entry: the number of random points to be generated by each thread.
Constraint: $1 \leq np$.
- 4: **x**[$np \times nb \times nt$] – FP *Output*

Note: \mathbf{x} is a device array.

When $nt=1$, the ordering of the output values, $x_{n,\tau,\beta}$, is identical to the standard sequential storage, $n+np\times\tau+nt\times np\times\beta$, where the indices, $n=0,1,\dots,np-1$, $\tau=0,1,\dots,nt-1$ and $\beta=0,1,\dots,nb-1$ denote the element, thread and block respectively.

Otherwise $x_{n,\tau,\beta}$, the n th element generated by thread τ in block β , is stored at location $\tau+nt\times n+nt\times np\times\beta$.

The template argument parameter FP can take type double or float.

On exit: the $np\times nb\times nt$ pseudorandom numbers from an exponential distribution with mean 1.0.

4 Error Indicators and Warnings

No argument constraint checking is carried out by this function. You can insert a call to function `nag_gpu_utilCheckMsg` (contained in the header file `nag_gpu.h`) following the call to `nag_gpu_mrg32k3a_exponential` to check for the last CUDA error message, if any, generated during execution.

5 Example

This example prints 64 pseudorandom numbers from an exponential distribution with mean 1.0, generated by `nag_gpu_mrg32k3a_exponential` after initialization by `nag_gpu_mrg32k3a_init`.

5.1 Program Text

[Program Text \(nag_gpu_mrg32k3a_exponential_exampleD.cu\)](#)

5.2 Program Data

None.

5.3 Program Results

[Program Results \(nag_gpu_mrg32k3a_exponential_exampleD.r\)](#)

[gpu_g05 Chapter Contents](#)

[gpu_g05 Chapter Introduction](#)

[NAG Numerical Routines for GPUs - Manual](#)

© The Numerical Algorithms Group Ltd, Oxford, UK. 2009