NAG Library Function Document

nag_init_vavilov (g01zuc)

1 Purpose

nag_init_vavilov (g01zuc) is used to initialize functions nag_prob_vavilov (g01euc) and nag_prob_density_vavilov (g01muc).

It is intended to be used before a call to nag_prob_vavilov (g01euc) or nag_prob_density_vavilov (g01muc).

2 Specification

```
#include <nag.h>
#include <nagg01.h>
void nag_init_vavilov (double rkappa, double beta2, Integer mode, double *xl,
     double *xu, double comm_arr[], NagError *fail)
```

3 Description

nag_init_vavilov (g01zuc) initializes the array **comm_arr** for use by nag_prob_vavilov (g01euc) or nag_prob_density_vavilov (g01muc) in the evaluation of the Vavilov functions $\phi_V(\lambda;\kappa,\beta^2)$ and $\Phi_V(\lambda;\kappa,\beta^2)$ respectively.

Multiple calls to nag_prob_vavilov (g01euc) or nag_prob_density_vavilov (g01muc) can be made following a single call to nag_init_vavilov (g01zuc), provided that **rkappa** or **beta2** do not change, and that either all calls are to nag_prob_vavilov (g01euc) or all calls are to nag_prob_density_vavilov (g01muc). If you wish to call both nag_prob_vavilov (g01euc) and nag_prob_density_vavilov (g01muc), then you will need to initialize both separately.

4 References

Schorr B (1974) Programs for the Landau and the Vavilov distributions and the corresponding random numbers *Comp. Phys. Comm.* **7** 215–224

5 Arguments

1: **rkappa** – double *Input*

On entry: the argument κ of the function.

Constraint: $0.01 \leq$ **rkappa** ≤ 10.0.

2: **beta2** – double *Input*

On entry: the argument β^2 of the function.

Constraint: $0.0 \leq$ **beta2** ≤ 1.0.

3: **mode** – Integer *Input*

On entry: if **mode** $= 0$, then nag_prob_density_vavilov (g01muc) is to be called after the call to nag_init_vavilov (g01zuc). Otherwise, nag_prob_vavilov (g01euc) is to be called.

4: **xl** – double * *Output*

On exit: x_l, a threshold value below which $\phi_V(\lambda;\kappa,\beta^2)$ will be set to zero by nag_prob_density_vavilov (g01muc) and $\Phi_V(\lambda;\kappa,\beta^2)$ will be set to zero by nag_prob_vavilov (g01euc) if $\lambda < x_l$.

5: **xu** – double * *Output*

On exit: x_u, a threshold value above which $\phi_V(\lambda;\kappa,\beta^2)$ will be set to zero by nag_prob_density_vavilov (g01muc) and $\Phi_V(\lambda;\kappa,\beta^2)$ will be set to unity by nag_prob_vavilov (g01euc) if $\lambda > x_u$.

6: **comm_arr**[**322**] – double *Communication Array*

On exit: this argument should be passed unchanged to nag_prob_vavilov (g01euc) or nag_prob_density_vavilov (g01muc).

7: **fail** – NagError * *Input/Output*

The NAG error argument (see Section 3.6 in the Essential Introduction).

6 Error Indicators and Warnings

NE_BAD_PARAM

On entry, argument ⟨*value*⟩ had an illegal value.

NE_INTERNAL_ERROR

An internal error has occurred in this function. Check the function call and any array sizes. If the call is correct then please contact NAG for assistance.

NE_REAL

On entry, **beta2** = ⟨*value*⟩.
Constraint: **beta2** ≤ 1.0.

On entry, **beta2** = ⟨*value*⟩.
Constraint: **beta2** ≥ 0.0.

On entry, **rkappa** = ⟨*value*⟩.
Constraint: **rkappa** ≤ 10.0.

On entry, **rkappa** = ⟨*value*⟩.
Constraint: **rkappa** ≥ 0.01.

7 Accuracy

At least five significant digits are usually correct.

8 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

See Section 10 in nag_prob_density_vavilov (g01muc) and nag_prob_vavilov (g01euc).