

## NAG C Library Function Document

### nag\_init\_vavilov (g01zuc)

#### 1 Purpose

nag\_init\_vavilov (g01zuc) is used to initialise functions nag\_prob\_density\_vavilov (g01muc) and nag\_prob\_vavilov (g01euc).

It is intended to be used before a call to nag\_prob\_density\_vavilov (g01muc) or nag\_prob\_vavilov (g01euc).

#### 2 Specification

```
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) initialises the array **comm\_arr** for use by nag\_prob\_density\_vavilov (g01muc) or nag\_prob\_vavilov (g01euc) in the evaluation of the Vavilov functions  $\phi_V(\lambda; \kappa, \beta^2)$  and  $\Phi_V(\lambda; \kappa, \beta^2)$  respectively.

#### 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 Parameters

- 1: **rkappa** – double *Input*  
*On entry:* the argument  $\kappa$  of the function.  
*Constraint:*  $0.01 \leq \text{rkappa} \leq 10.0$ .
- 2: **beta2** – double *Input*  
*On entry:* the argument  $\beta^2$  of the function.  
*Constraint:*  $0.0 \leq \text{beta2} \leq 1.0$ .
- 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 *Output*  
*On exit:* this parameter should be passed unchanged to nag\_prob\_vavilov (g01euc) or nag\_prob\_density\_vavilov (g01muc).
- 7: **fail** – NagError \* *Input/Output*  
The NAG error parameter (see the Essential Introduction).

## 6 Error Indicators and Warnings

### NE\_REAL

On entry, **beta2** =  $\langle value \rangle$ .

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

On entry, **beta2** =  $\langle value \rangle$ .

Constraint: **beta2**  $\geq 0.0$ .

On entry, **rkappa** =  $\langle value \rangle$ .

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

On entry, **rkappa** =  $\langle value \rangle$ .

Constraint: **rkappa**  $\geq 0.01$ .

### NE\_BAD\_PARAM

On entry, parameter  $\langle value \rangle$  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 consult NAG for assistance.

## 7 Accuracy

At least 5 significant digits are usually correct.

## 8 Further Comments

None.

## 9 Example

See Section 9 of the documents for nag\_prob\_density\_vavilov (g01muc) and nag\_prob\_vavilov (g01euc).

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