NAG Toolbox for MATLAB

s18cc

1 Purpose

s18cc returns a value of the scaled modified Bessel function $e^x K_0(x)$ via the function name.

2 Syntax

```
[result, ifail] = s18cc(x)
```

3 Description

s18cc evaluates an approximation to $e^x K_0(x)$, where K_0 is a modified Bessel function of the second kind. The scaling factor e^x removes most of the variation in $K_0(x)$.

The function uses the same Chebyshev expansions as s18ac, which returns the unscaled value of $K_0(x)$.

4 References

Abramowitz M and Stegun I A 1972 *Handbook of Mathematical Functions* (3rd Edition) Dover Publications

5 Parameters

5.1 Compulsory Input Parameters

1: **x – double scalar**

The argument x of the function.

Constraint: $\mathbf{x} > 0.0$.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **result – double scalar**

The result of the function.

2: **ifail – int32 scalar**

0 unless the function detects an error (see Section 6).

6 Error Indicators and Warnings

Errors or warnings detected by the function:

ifail $= 1$

On entry, $\mathbf{x} \leq 0.0$, K_0 is undefined.

On soft failure, s18cc returns zero.

7 Accuracy

Relative errors in the argument are attenuated when propagated into the function value. When the accuracy of the argument is essentially limited by the ***machine precision***, the accuracy of the function value will be similarly limited by at most a small multiple of the ***machine precision***.

8 Further Comments

None.

9 Example

```
x = 0.4;
[result, ifail] = s18cc(x)
```

```
result =
    1.6627
ifail =
           0
```