

NAG Toolbox for MATLAB

s18ce

1 Purpose

s18ce returns a value of the scaled modified Bessel function $e^{-|x|}I_0(x)$ via the function name.

2 Syntax

```
[result, ifail] = s18ce(x)
```

3 Description

s18ce evaluates an approximation to $e^{-|x|}I_0(x)$, where I_0 is a modified Bessel function of the first kind. The scaling factor $e^{-|x|}$ removes most of the variation in $I_0(x)$.

The function uses the same Chebyshev expansions as s18ae, which returns the unscaled value of $I_0(x)$.

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.

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

There are no actual failure exits from this function. **ifail** is always set to zero. This parameter is included for compatibility with other functions in this chapter.

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;
[result, ifail] = s18ce(x)

result =
      1
ifail =
      0
```
