NAG Fortran Library Routine Document

F06TTF

Note: before using this routine, please read the Users' Note for your implementation to check the interpretation of ***bold italicised*** terms and other implementation-dependent details.

1 Purpose

F06TTF performs one of the transformations

$$R \leftarrow PUQ^H \quad \text{or} \quad R \leftarrow QUP^H,$$

where U is a given n by n complex upper triangular matrix, P is a given complex unitary matrix, and Q is a complex unitary matrix chosen to make R upper triangular. Both P and Q are represented as sequences of plane rotations in planes k_1 to k_2.

If SIDE $=$ 'L', then

$$R \leftarrow PUQ^H, \quad \text{where} \quad \begin{aligned} P &= P_{k_2-1} \ldots P_{k_1+1} P_{k_1}, \\ Q &= Q_{k_2-1} \ldots Q_{k_1+1} Q_{k_1}. \end{aligned}$$

If SIDE $=$ 'R', then

$$R \leftarrow QUP^H, \quad \text{where} \quad \begin{aligned} P &= P_{k_1} P_{k_1+1} \ldots P_{k_2-1}, \\ Q &= Q_{k_1} Q_{k_1+1} \ldots Q_{k_2-1}. \end{aligned}$$

In either case P_k and Q_k are rotations in the $(k, k+1)$ plane.

The 2 by 2 rotation part of P_k or Q_k has the form

$$\begin{pmatrix} c_k & \bar{s}_k \\ -s_k & c_k \end{pmatrix}$$

with c_k real.

2 Specification

```
SUBROUTINE F06TTF (SIDE, N, K1, K2, C, S, A, LDA)
INTEGER             N, K1, K2, LDA
double precision    C(*)
complex*16          S(*), A(LDA,*)
CHARACTER*1         SIDE
```

3 Description

None.

4 References

None.

5 Parameters

1: SIDE – CHARACTER*1 *Input*

On entry: specifies whether P is applied from the left or the right in the transformation, as follows:

if SIDE = 'L', from the left;
if SIDE = 'R', from the right.

Constraint: SIDE = 'L' or 'R'.

2: N – INTEGER *Input*

On entry: n, the order of the matrices U and R.

Constraint: $\mathrm{N} \geq 0$.

3: K1 – INTEGER *Input*
4: K2 – INTEGER *Input*

On entry: the values k_1 and k_2.

5: C($*$) – ***double precision*** array *Input/Output*

On entry: $\mathrm{C}(k)$ must hold the cosine of the rotation P_k, for $k = k_1, \ldots, k_2 - 1$.

On exit: $\mathrm{C}(k)$ holds the cosine of the rotation Q_k, for $k = k_1, \ldots, k_2 - 1$.

6: S($*$) – ***complex*16*** array *Input/Output*

On entry: $\mathrm{S}(k)$ must hold the sine of the rotation P_k, for $k = k_1, \ldots, k_2 - 1$.

On exit: $\mathrm{S}(k)$ holds the sine of the rotation Q_k, for $k = k_1, \ldots, k_2 - 1$.

7: A(LDA,$*$) – ***complex*16*** array *Input/Output*

Note: the second dimension of the array A must be at least $\max(1, \mathrm{N})$.

On entry: the n by n upper triangular matrix U.

On exit: the upper triangular matrix R.

8: LDA – INTEGER *Input*

On entry: the first dimension of the array A as declared in the (sub)program from which F06TTF is called.

Constraint: $\mathrm{LDA} \geq \max(1, \mathrm{N})$.

6 Error Indicators and Warnings

None.