NAG C Library Chapter Contents

f08 – Least-squares and Eigenvalue Problems (LAPACK)

f08 Chapter Introduction

Routine Name	Mark of Introduction	Purpose
f08aec	7	nag_dgeqrf *QR* factorization of real general rectangular matrix
f08afc	7	nag_dorgqr Form all or part of orthogonal *Q* from *QR* factorization determined by nag_dgeqrf (f08aec) or nag_dgeqpf (f08bec)
f08agc	7	nag_dormqr Apply orthogonal transformation determined by nag_dgeqrf (f08aec) or nag_dgeqpf (f08bec)
f08ahc	7	nag_dgelqf *LQ* factorization of real general rectangular matrix
f08ajc	7	nag_dorglq Form all or part of orthogonal *Q* from *LQ* factorization determined by nag_dgelqf (f08ahc)
f08akc	7	nag_dormlq Apply orthogonal transformation determined by nag_dgelqf (f08ahc)
f08asc	7	nag_zgeqrf *QR* factorization of complex general rectangular matrix
f08atc	7	nag_zungqr Form all or part of unitary *Q* from *QR* factorization determined by nag_zgeqrf (f08asc) or nag_zgeqpf (f08bsc)
f08auc	7	nag_zunmqr Apply unitary transformation determined by nag_zgeqrf (f08asc) or nag_zgeqpf (f08bsc)
f08avc	7	nag_zgelqf *LQ* factorization of complex general rectangular matrix
f08awc	7	nag_zunglq Form all or part of unitary *Q* from *LQ* factorization determined by nag_zgelqf (f08avc)
f08axc	7	nag_zunmlq Apply unitary transformation determined by nag_zgelqf (f08avc)
f08bec	7	nag_dgeqpf *QR* factorization of real general rectangular matrix with column pivoting
f08bsc	7	nag_zgeqpf *QR* factorization of complex general rectangular matrix with column pivoting
f08fcc	7	nag_dsyevd All eigenvalues and optionally all eigenvectors of real symmetric matrix (divide-and-conquer)
f08fec	7	nag_dsytrd Orthogonal reduction of real symmetric matrix to symmetric tridiagonal form
f08ffc	7	nag_dorgtr Generate orthogonal transformation matrix from reduction to tridiagonal form determined by nag_dsytrd (f08fec)
f08fgc	7	nag_dormtr Apply orthogonal transformation determined by nag_dsytrd (f08fec)
f08fqc	7	nag_zheevd All eigenvalues and optionally all eigenvectors of complex Hermitian matrix (divide-and-conquer)

f08fsc	7	nag_zhetrd
		Unitary reduction of complex Hermitian matrix to real symmetric tridiagonal form
f08ftc	7	nag_zungtr
		Generate unitary transformation matrix from reduction to tridiagonal form determined by nag_zhetrd (f08fsc)
f08fuc	7	nag_zunmtr
		Apply unitary transformation matrix determined by nag_zhetrd (f08fsc)
f08gcc	7	nag_dspevd
		All eigenvalues and optionally all eigenvectors of real symmetric matrix, packed storage (divide-and-conquer)
f08gec	7	nag_dsptrd
		Orthogonal reduction of real symmetric matrix to symmetric tridiagonal form, packed storage
f08gfc	7	nag_dopgtr
		Generate orthogonal transformation matrix from reduction to tridiagonal form determined by nag_dsptrd (f08gec)
f08ggc	7	nag_dopmtr
		Apply orthogonal transformation determined by nag_dsptrd (f08gec)
f08gqc	7	nag_zhpevd
		All eigenvalues and optionally all eigenvectors of complex Hermitian matrix, packed storage (divide-and-conquer)
f08gsc	7	nag_zhptrd
		Unitary reduction of complex Hermitian matrix to real symmetric tridiagonal form, packed storage
f08gtc	7	nag_zupgtr
		Generate unitary transformation matrix from reduction to tridiagonal form determined by nag_zhptrd (f08gsc)
f08guc	7	nag_zupmtr
		Apply unitary transformation matrix determined by nag_zhptrd (f08gsc)
f08hcc	7	nag_dsbevd
		All eigenvalues and optionally all eigenvectors of real symmetric band matrix (divide-and-conquer)
f08hec	7	nag_dsbtrd
		Orthogonal reduction of real symmetric band matrix to symmetric tridiagonal form
f08hqc	7	nag_zhbevd
		All eigenvalues and optionally all eigenvectors of complex Hermitian band matrix (divide-and-conquer)
f08hsc	7	nag_zhbtrd
		Unitary reduction of complex Hermitian band matrix to real symmetric tridiagonal form
f08jcc	7	nag_dstevd
		All eigenvalues and optionally all eigenvectors of real symmetric tridiagonal matrix (divide-and-conquer)
f08jec	7	nag_dsteqr
		All eigenvalues and eigenvectors of real symmetric tridiagonal matrix, reduced from real symmetric matrix using implicit QL or QR
f08jfc	7	nag_dsterf
		All eigenvalues of real symmetric tridiagonal matrix, root-free variant of QL or QR
f08jgc	7	nag_dpteqr
		All eigenvalues and eigenvectors of real symmetric positive-definite tridiagonal matrix, reduced from real symmetric positive-definite matrix
f08jjc	7	nag_dstebz
		Selected eigenvalues of real symmetric tridiagonal matrix by bisection
f08jkc	7	nag_dstein
		Selected eigenvectors of real symmetric tridiagonal matrix by inverse iteration, storing eigenvectors in real array

f08jsc	7	nag_zsteqr
		All eigenvalues and eigenvectors of real symmetric tridiagonal matrix, reduced from complex Hermitian matrix, using implicit QL or QR
f08juc	7	nag_zpteqr
		All eigenvalues and eigenvectors of real symmetric positive-definite tridiagonal matrix, reduced from complex Hermitian positive-definite matrix
f08jxc	7	nag_zstein
		Selected eigenvectors of real symmetric tridiagonal matrix by inverse iteration, storing eigenvectors in complex array
f08kec	7	nag_dgebrd
		Orthogonal reduction of real general rectangular matrix to bidiagonal form
f08kfc	7	nag_dorgbr
		Generate orthogonal transformation matrices from reduction to bidiagonal form determined by nag_dgebrd (f08kec)
f08kgc	7	nag_dormbr
		Apply orthogonal transformations from reduction to bidiagonal form determined by nag_dgebrd (f08kec)
f08ksc	7	nag_zgebrd
		Unitary reduction of complex general rectangular matrix to bidiagonal form
f08ktc	7	nag_zungbr
		Generate unitary transformation matrices from reduction to bidiagonal form determined by nag_zgebrd (f08ksc)
f08kuc	7	nag_zunmbr
		Apply unitary transformations from reduction to bidiagonal form determined by nag_zgebrd (f08ksc)
f08lec	7	nag_dgbbrd
		Reduction of real rectangular band matrix to upper bidiagonal form
f08lsc	7	nag_zgbbrd
		Reduction of complex rectangular band matrix to upper bidiagonal form
f08mec	7	nag_dbdsqr
		SVD of real bidiagonal matrix reduced from real general matrix
f08msc	7	nag_zbdsqr
		SVD of real bidiagonal matrix reduced from complex general matrix
f08nec	7	nag_dgehrd
		Orthogonal reduction of real general matrix to upper Hessenberg form
f08nfc	7	nag_dorghr
		Generate orthogonal transformation matrix from reduction to Hessenberg form determined by nag_dgehrd (f08nec)
f08ngc	7	nag_dormhr
		Apply orthogonal transformation matrix from reduction to Hessenberg form determined by nag_dgehrd (f08nec)
f08nhc	7	nag_dgebal
		Balance real general matrix
f08njc	7	nag_dgebak
		Transform eigenvectors of real balanced matrix to those of original matrix supplied to nag_dgebal (f08nhc)
f08nsc	7	nag_zgehrd
		Unitary reduction of complex general matrix to upper Hessenberg form
f08ntc	7	nag_zunghr
		Generate unitary transformation matrix from reduction to Hessenberg form determined by nag_zgehrd (f08nsc)
f08nuc	7	nag_zunmhr
		Apply unitary transformation matrix from reduction to Hessenberg form determined by nag_zgehrd (f08nsc)
f08nvc	7	nag_zgebal
		Balance complex general matrix
f08nwc	7	nag_zgebak
		Transform eigenvectors of complex balanced matrix to those of original matrix supplied to nag_zgebal (f08nvc)

f08pec   7   nag_dhseqr
Eigenvalues and Schur factorization of real upper Hessenberg matrix reduced from real general matrix

f08pkc   7   nag_dhsein
Selected right and/or left eigenvectors of real upper Hessenberg matrix by inverse iteration

f08psc   7   nag_zhseqr
Eigenvalues and Schur factorization of complex upper Hessenberg matrix reduced from complex general matrix

f08pxc   7   nag_zhsein
Selected right and/or left eigenvectors of complex upper Hessenberg matrix by inverse iteration

f08qfc   7   nag_dtrexc
Reorder Schur factorization of real matrix using orthogonal similarity transformation

f08qgc   7   nag_dtrsen
Reorder Schur factorization of real matrix, form orthonormal basis of right invariant subspace for selected eigenvalues, with estimates of sensitivities

f08qhc   7   nag_dtrsyl
Solve real Sylvester matrix equation $AX + XB = C$, A and B are upper quasi-triangular or transposes

f08qkc   7   nag_dtrevc
Left and right eigenvectors of real upper quasi-triangular matrix

f08qlc   7   nag_dtrsna
Estimates of sensitivities of selected eigenvalues and eigenvectors of real upper quasi-triangular matrix

f08qtc   7   nag_ztrexc
Reorder Schur factorization of complex matrix using unitary similarity transformation

f08quc   7   nag_ztrsen
Reorder Schur factorization of complex matrix, form orthonormal basis of right invariant subspace for selected eigenvalues, with estimates of sensitivities

f08qvc   7   nag_ztrsyl
Solve complex Sylvester matrix equation $AX + XB = C$, A and B are upper triangular or conjugate-transposes

f08qxc   7   nag_ztrevc
Left and right eigenvectors of complex upper triangular matrix

f08qyc   7   nag_ztrsna
Estimates of sensitivities of selected eigenvalues and eigenvectors of complex upper triangular matrix

f08sec   7   nag_dsygst
Reduction to standard form of real symmetric-definite generalized eigenproblem $Ax = \lambda Bx$, $ABx = \lambda x$ or $BAx = \lambda x$, B factorized by nag_dpotrf (f07fdc)

f08ssc   7   nag_zhegst
Reduction to standard form of complex Hermitian-definite generalized eigenproblem $Ax = \lambda Bx$, $ABx = \lambda x$ or $BAx = \lambda x$, B factorized by nag_zpotrf (f07frc)

f08tec   7   nag_dspgst
Reduction to standard form of real symmetric-definite generalized eigenproblem $Ax = \lambda Bx$, $ABx = \lambda x$ or $BAx = \lambda x$, packed storage, B factorized by nag_dpptrf (f07gdc)

f08tsc   7   nag_zhpgst
Reduction to standard form of complex Hermitian-definite generalized eigenproblem $Ax = \lambda Bx$, $ABx = \lambda x$ or $BAx = \lambda x$, packed storage, B factorized by nag_zpptrf (f07grc)

f08uec   7   nag_dsbgst
Reduction of real symmetric-definite banded generalized eigenproblem $Ax = \lambda Bx$ to standard form $Cy = \lambda y$, such that C has the same bandwidth as A

f08ufc	7	nag_dpbstf
		Computes a split Cholesky factorization of real symmetric positive-definite band matrix A
f08usc	7	nag_zhbgst
		Reduction of complex Hermitian-definite banded generalized eigenproblem $Ax = \lambda Bx$ to standard form $Cy = \lambda y$, such that C has the same bandwidth as A
f08utc	7	nag_zpbstf
		Computes a split Cholesky factorization of complex Hermitian positive-definite band matrix A
f08wec	7	nag_dgghrd
		Orthogonal reduction of a pair of real general matrices to generalized upper Hessenberg form
f08whc	7	nag_dggbal
		Balance a pair of real general matrices
f08wjc	7	nag_dggbak
		Transform eigenvectors of a pair of real balanced matrices to those of original matrix pair supplied to nag_dggbal (f08whc)
f08wsc	7	nag_zgghrd
		Unitary reduction of a pair of complex general matrices to generalized upper Hessenberg form
f08wvc	7	nag_zggbal
		Balance a pair of complex general matrices
f08wwc	7	nag_zggbak
		Transform eigenvectors of a pair of complex balanced matrices to those of original matrix pair supplied to nag_zggbal (f08wvc)
f08xec	7	nag_dhgeqz
		Eigenvalues and generalized Schur factorization of real generalized upper Hessenberg form reduced from a pair of real general matrices
f08xsc	7	nag_zhgeqz
		Eigenvalues and generalized Schur factorization of complex generalized upper Hessenberg form reduced from a pair of complex general matrices
f08ykc	7	nag_dtgevc
		Left and right eigenvectors of a pair of real upper quasi-triangular matrices
f08yxc	7	nag_ztgevc
		Left and right eigenvectors of a pair of complex upper triangular matrices