

NAG Fortran Library

Mark 21 News

1 Introduction

At Mark 21 of the Fortran Library new functionality has been introduced in addition to improvements in existing areas. The Library now contains 1467 documented routines, of which 219 are new at this Mark.

A new chapter on large scale eigenproblems has been introduced, and extensions have been included in the areas of optimization, dense and banded linear algebra, direct solution of large scale linear systems, simple calculations with statistics, regression, random numbers, and special functions.

The new chapter on Large Scale Eigenproblems (F12) has routines for the solution of symmetric and nonsymmetric standard and generalized large scale eigenvalue problems. Chapter F11 has been renamed as Large Scale Linear Systems, and new routines for the direct solution of sparse problems have been added.

Chapter E04 (Minimizing or Maximizing a Function) has been updated with new routines for the solution of LP, QP and nonlinear programming problems with sparse linear constraints.

Chapters F07 (Linear Equations (LAPACK)) and F08 (Least-squares and Eigenvalue Problems (LAPACK)) have been extended to include all the LAPACK driver routines, thus allowing the solution of most problems with a call to a single routine rather than multiple calls to LAPACK computational routines. A comprehensive suite of driver routines for the solution of dense and banded linear equations has also been added to Chapter F04 (Simultaneous Linear Equations).

Routines for Landau and Vavilov distributions have been added to Chapter G01 (Simple Calculations on Statistical Data), new routines for stepwise regression and mixed effects regression have been included in Chapter G02 (Correlation and Regression Analysis), and a number of new random number generators, including Copulas and improved quasi-random number generators have been added to Chapter G05 (Random Number Generators).

Variant routines for the log Gamma function, and Bessel function of the 1st kind have been added to Chapter S (Approximations of Special Functions).

2 New Routines

The 219 new user-callable routines included in the Fortran Library at Mark 21 are as follows.

2.1 Routines with New Functionality

A00ACF	Check availability of a valid licence key
E04NPF	Initialization routine for E04NQF
E04NQF	LP or QP problem (suitable for sparse problems)
E04NRF	Supply optional parameter values for E04NQF from external file
E04NSF	Set a single option for E04NQF from a character string
E04NTF	Set a single option for E04NQF from an INTEGER argument
E04NUF	Set a single option for E04NQF from a double precision argument
E04NXF	Get the setting of an INTEGER valued option of E04NQF
E04NYF	Get the setting of a double precision valued option of E04NQF
E04VGF	Initialization routine for E04VHF
E04VHF	General sparse nonlinear optimizer
E04VJF	Determine the pattern of nonzeros in the Jacobian matrix for E04VHF
E04VKF	Supply optional parameter values for E04VHF from external file
E04VLF	Set a single option for E04VHF from a character string
E04VMF	Set a single option for E04VHF from an INTEGER argument
E04VNF	Set a single option for E04VHF from a double precision argument
E04VRF	Get the setting of an INTEGER valued option of E04VHF
E04VSF	Get the setting of a double precision valued option of E04VHF

E04WCF	Initialization routine for E04WDF
E04WDF	Solves the nonlinear programming (NP) problem
E04WEF	Supply optional parameter values for E04WDF from external file
E04WFF	Set a single option for E04WDF from a character string
E04WGF	Set a single option for E04WDF from an INTEGER argument
E04WHF	Set a single option for E04WDF from a <i>double precision</i> argument
E04WJF	Determine whether an E04WDF option has been set or not
E04WKF	Get the setting of an INTEGER valued option of E04WDF
E04WLF	Get the setting of a <i>double precision</i> valued option of E04WDF
F04BAF	Computes the solution and error-bound to a real system of linear equations
F04BBF	Computes the solution and error-bound to a real banded system of linear equations
F04BCF	Computes the solution and error-bound to a real tridiagonal system of linear equations
F04BDF	Computes the solution and error-bound to a real symmetric positive-definite system of linear equations
F04BEF	Computes the solution and error-bound to a real symmetric positive-definite system of linear equations (stored in packed format)
F04BFF	Computes the solution and error-bound to a real symmetric positive-definite banded system of linear equations
F04BGF	Computes the solution and error-bound to a real symmetric positive-definite tridiagonal system of linear equations
F04BHF	Computes the solution and error-bound to a real symmetric system of linear equations
F04BJF	Computes the solution and error-bound to a real symmetric system of linear equations (stored in packed format)
F04CAF	Computes the solution and error-bound to a complex system of linear equations
F04CBF	Computes the solution and error-bound to a complex banded system of linear equations
F04CCF	Computes the solution and error-bound to a complex tridiagonal system of linear equations
F04CDF	Computes the solution and error-bound to a complex Hermitian positive-definite system of linear equations
F04CEF	Computes the solution and error-bound to a complex Hermitian positive-definite system of linear equations (stored in packed format)
F04CFE	Computes the solution and error-bound to a complex Hermitian positive-definite banded system of linear equations
F04CGF	Computes the solution and error-bound to a complex Hermitian positive-definite tridiagonal system of linear equations
F04CHF	Computes the solution and error-bound to a complex Hermitian system of linear equations
F04CJF	Computes the solution and error-bound to a complex Hermitian system of linear equations (stored in packed format)
F04DHF	Computes the solution and error-bound to a complex symmetric system of linear equations
F04DJF	Computes the solution and error-bound to a complex symmetric system of linear equations (stored in packed format).
F06FEF	Multiply real vector by reciprocal of scalar
F06KEF	Multiply complex vector by reciprocal of real scalar
F06RNF	1-norm, ∞ -norm, Frobenius norm, largest absolute element, real tridiagonal matrix
F06RPF	1-norm, ∞ -norm, Frobenius norm, largest absolute element, real symmetric tridiagonal matrix
F06TAF	Matrix-vector product, complex symmetric matrix
F06TBF	Rank-1 update, complex symmetric matrix
F06TCF	Matrix-vector product, complex symmetric packed matrix
F06TDF	Rank-1 update, complex symmetric packed matrix
F06UNF	1-norm, ∞ -norm, Frobenius norm, largest absolute element, complex tridiagonal matrix
F06UPF	1-norm, ∞ -norm, Frobenius norm, largest absolute element, complex Hermitian tridiagonal matrix
F07AAF	Computes the solution to a real system of linear equations
F07ABF	Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a real system of linear equations
F07ANF	Computes the solution to a complex system of linear equations
F07APF	Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a complex system of linear equations
F07BAF	Computes the solution to a real banded system of linear equations

F07BBF	Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a real banded system of linear equations
F07BNF	Computes the solution to a complex banded system of linear equations
F07BPF	Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a complex banded system of linear equations
F07CAF	Computes the solution to a real tridiagonal system of linear equations
F07CBF	Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a real tridiagonal system of linear equations
F07CNF	Computes the solution to a complex tridiagonal system of linear equations
F07CPF	Uses the <i>LU</i> factorization to compute the solution, error-bound and condition estimate for a complex tridiagonal system of linear equations
F07FAF	Computes the solution to a real symmetric positive-definite system of linear equations
F07FBF	Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive-definite system of linear equations
F07FNF	Computes the solution to a complex Hermitian positive-definite system of linear equations
F07FPF	Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive-definite system of linear equations
F07GAF	Computes the solution to a real symmetric positive-definite system of linear equations (stored in packed format)
F07GBF	Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive-definite system of linear equations (stored in packed format)
F07GNF	Computes the solution to a complex Hermitian positive-definite system of linear equations (stored in packed format)
F07GPF	Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive-definite system of linear equations (stored in packed format)
F07HAF	Computes the solution to a real symmetric positive-definite banded system of linear equations (stored in packed format)
F07HBF	Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive-definite banded system of linear equations (stored in packed format)
F07HNF	Computes the solution to a complex Hermitian positive-definite banded system of linear equations (stored in packed format)
F07HPF	Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive-definite banded system of linear equations (stored in packed format)
F07JAF	Computes the solution to a real symmetric positive-definite tridiagonal system of linear equations
F07JBF	Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a real symmetric positive-definite tridiagonal system of linear equations
F07JNF	Computes the solution to a complex Hermitian positive-definite tridiagonal system of linear equations
F07JPF	Uses the Cholesky factorization to compute the solution, error-bound and condition estimate for a complex Hermitian positive-definite tridiagonal system of linear equations
F07MAF	Computes the solution to a real symmetric system of linear equations
F07MBF	Uses the diagonal pivoting factorization to compute the solution to a real symmetric system of linear equations
F07MNF	Computes the solution to a complex Hermitian system of linear equations
F07MPF	Uses the diagonal pivoting factorization to compute the solution to a complex Hermitian system of linear equations
F07NNF	Computes the solution to a complex symmetric system of linear equations
F07NPF	Uses the diagonal pivoting factorization to compute the solution to a complex symmetric system of linear equations
F07PAF	Computes the solution to a real symmetric system of linear equations (stored in packed format)
F07PBF	Uses the diagonal pivoting factorization to compute the solution to a real symmetric system of linear equations (stored in packed format)
F07PNF	Computes the solution to a complex Hermitian system of linear equations (stored in packed format)
F07PPF	Uses the diagonal pivoting factorization to compute the solution to a complex Hermitian system of linear equations (stored in packed format)

F07QNF	Computes the solution to a complex symmetric system of linear equations (stored in packed format)
F07QPF	Uses the diagonal pivoting factorization to compute the solution to a complex symmetric system of linear equations (stored in packed format)
F08AAF	Solves an overdetermined or underdetermined real linear system
F08ANF	Solves an overdetermined or underdetermined complex linear system
F08BAF	Computes the minimum-norm solution to a real linear least-squares problem
F08BNF	Computes the minimum-norm solution to a complex linear least-squares problem
F08FAF	Computes all eigenvalues and, optionally, eigenvectors of a real symmetric matrix
F08FBF	Computes selected eigenvalues and, optionally, eigenvectors of a real symmetric matrix
F08FDF	Computes selected eigenvalues and, optionally, eigenvectors of a real symmetric matrix (divide-and-conquer)
F08FNF	Computes all eigenvalues and, optionally, eigenvectors of a complex Hermitian matrix
F08FPF	Computes selected eigenvalues and, optionally, eigenvectors of a complex Hermitian matrix
F08FRF	Computes selected eigenvalues and, optionally, eigenvectors of a complex Hermitian matrix (divide-and-conquer)
F08GAF	Computes all eigenvalues and, optionally, eigenvectors of a real symmetric matrix (stored in packed format)
F08GBF	Computes selected eigenvalues and, optionally, eigenvectors of a real symmetric matrix (stored in packed format)
F08GNF	Computes all eigenvalues and, optionally, eigenvectors of a complex Hermitian matrix (stored in packed format)
F08GPF	Computes selected eigenvalues and, optionally, eigenvectors of a complex Hermitian matrix (stored in packed format)
F08HAF	Computes all eigenvalues and, optionally, eigenvectors of a real symmetric band matrix
F08HBF	Computes selected eigenvalues and, optionally, eigenvectors of a real symmetric band matrix
F08HNF	Computes all eigenvalues and, optionally, eigenvectors of a complex Hermitian band matrix
F08HPF	Computes selected eigenvalues and, optionally, eigenvectors of a complex Hermitian band matrix
F08JAF	Computes all eigenvalues and, optionally, eigenvectors of a real symmetric tridiagonal matrix
F08JBF	Computes selected eigenvalues and, optionally, eigenvectors of a real symmetric tridiagonal matrix
F08JDF	Computes selected eigenvalues and, optionally, eigenvectors of a real symmetric tridiagonal matrix (Relatively Robust representations).
F08KAF	Computes the minimum-norm solution to a real linear least-squares problem using singular value decomposition
F08KBF	Computes the singular value decomposition of a real matrix, optionally computing the left and/or right singular vectors
F08KCF	Computes the minimum-norm solution to a real linear least-squares problem using singular value decomposition (divide-and-conquer)
F08KDF	Computes the singular value decomposition of a real matrix, optionally computing the left and/or right singular vectors (divide-and-conquer)
F08KNF	Computes the minimum-norm solution to a complex linear least-squares problem using singular value decomposition
F08KPF	Computes the singular value decomposition of a complex matrix, optionally computing the left and/or right singular vectors
F08KQF	Computes the minimum-norm solution to a complex linear least-squares problem using singular value decomposition (divide-and-conquer)
F08KRF	Computes the singular value decomposition of a complex matrix, optionally computing the left and/or right singular vectors (divide-and-conquer)
F08NAF	Computes all eigenvalues and, optionally, left and/or right eigenvectors of a real nonsymmetric matrix
F08NBF	Computes all eigenvalues and, optionally, left and/or right eigenvectors of a real nonsymmetric matrix; also, optionally, the balancing transformation, the reciprocal condition numbers for the eigenvalues and for the right eigenvectors
F08NNF	Computes all eigenvalues and, optionally, left and/or right eigenvectors of a complex nonsymmetric matrix

F08NPF	Computes all eigenvalues and, optionally, left and/or right eigenvectors of a complex nonsymmetric matrix; also, optionally, the balancing transformation, the reciprocal condition numbers for the eigenvalues and for the right eigenvectors
F08PAF	Computes for real square nonsymmetric matrix, the eigenvalues, the real Schur form, and, optionally, the matrix of Schur vectors
F08PBF	Computes for real square nonsymmetric matrix, the eigenvalues, the real Schur form, and, optionally, the matrix of Schur vectors; also, optionally, computes reciprocal condition numbers for selected eigenvalues
F08PNF	Computes for complex square nonsymmetric matrix, the eigenvalues, the Schur form, and, optionally, the matrix of Schur vectors
F08PPF	Computes for real square nonsymmetric matrix, the eigenvalues, the Schur form, and, optionally, the matrix of Schur vectors; also, optionally, computes reciprocal condition numbers for selected eigenvalues
F08SAF	Computes all the eigenvalues, and optionally, the eigenvectors of a real generalized symmetric-definite eigenproblem
F08SBF	Computes selected eigenvalues, and optionally, the eigenvectors of a real generalized symmetric-definite eigenproblem
F08SCF	Computes all the eigenvalues, and optionally, the eigenvectors of a real generalized symmetric-definite eigenproblem (divide-and-conquer)
F08SNF	Computes all the eigenvalues, and optionally, the eigenvectors of a complex generalized Hermitian-definite eigenproblem
F08SPF	Computes selected eigenvalues, and optionally, the eigenvectors of a complex generalized Hermitian-definite eigenproblem
F08SQF	Computes all the eigenvalues, and optionally, the eigenvectors of a complex generalized Hermitian-definite eigenproblem (divide-and-conquer)
F08TAF	Computes all the eigenvalues, and optionally, the eigenvectors of a real generalized symmetric-definite eigenproblem (packed storage format)
F08TBF	Computes selected eigenvalues, and optionally, the eigenvectors of a real generalized symmetric-definite eigenproblem (packed storage format)
F08TCF	Computes all the eigenvalues, and optionally, the eigenvectors of a real generalized symmetric-definite eigenproblem (packed storage format, divide-and-conquer)
F08TNF	Computes all the eigenvalues, and optionally, the eigenvectors of a complex generalized Hermitian-definite eigenproblem (packed storage format)
F08TPF	Computes selected eigenvalues, and optionally, the eigenvectors of a complex generalized Hermitian-definite eigenproblem (packed storage format)
F08TQF	Computes selected eigenvalues, and optionally, the eigenvectors of a complex generalized Hermitian-definite eigenproblem (packed storage format, divide-and-conquer)
F08UAF	Computes all the eigenvalues, and optionally, the eigenvectors of a real banded generalized symmetric-definite eigenproblem
F08UBF	Computes selected eigenvalues, and optionally, the eigenvectors of a real banded generalized symmetric-definite eigenproblem
F08UCF	Computes all the eigenvalues, and optionally, the eigenvectors of a real banded generalized symmetric-definite eigenproblem (divide-and-conquer)
F08UNF	Computes all the eigenvalues, and optionally, the eigenvectors of a complex banded generalized Hermitian-definite eigenproblem
F08UPF	Computes selected eigenvalues, and optionally, the eigenvectors of a complex banded generalized Hermitian-definite eigenproblem
F08UQF	Computes all the eigenvalues, and optionally, the eigenvectors of a complex banded generalized Hermitian-definite eigenproblem (divide-and-conquer)
F08VAF	Computes the generalized singular value decomposition of a real matrix pair
F08VNF	Computes the generalized singular value decomposition of a complex matrix pair
F08WAF	Computes, for a real nonsymmetric matrix pair, the generalized eigenvalues, and optionally, the left and/or right generalized eigenvectors
F08WBF	Computes, for a real nonsymmetric matrix pair, the generalized eigenvalues, and optionally, the left and/or right generalized eigenvectors; also, optionally, the balancing transformation, the reciprocal condition numbers for the eigenvalues and for the right eigenvectors
F08WNF	Computes, for a complex nonsymmetric matrix pair, the generalized eigenvalues, and optionally, the left and/or right generalized eigenvectors

F08WPF	Computes, for a complex nonsymmetric matrix pair, the generalized eigenvalues, and optionally, the left and/or right generalized eigenvectors; also, optionally, the balancing transformation, the reciprocal condition numbers for the eigenvalues and for the right eigenvectors
F08XAF	Computes, for a real nonsymmetric matrix pair, the generalized eigenvalues, the generalized real Schur form and, optionally, the left and/or right matrices of Schur vectors
F08XBF	Computes, for a real nonsymmetric matrix pair, the generalized eigenvalues, the generalized real Schur form and, optionally, the left and/or right matrices of Schur vectors; also, optionally, computes reciprocal condition numbers for selected eigenvalues
F08XNF	Computes, for a complex nonsymmetric matrix pair, the generalized eigenvalues, the generalized complex Schur form and, optionally, the left and/or right matrices of Schur vectors
F08XPf	Computes, for a complex nonsymmetric matrix pair, the generalized eigenvalues, the generalized complex Schur form and, optionally, the left and/or right matrices of Schur vectors; also, optionally, computes reciprocal condition numbers for selected eigenvalues
F08ZAF	Solves the real linear equality-constrained least-squares (LSE) problem
F08ZBF	Solves a real general Gauss–Markov linear model (GLM) problem
F08ZNF	Solves the complex linear equality-constrained least-squares (LSE) problem
F08ZPF	Solves a complex general Gauss–Markov linear model (GLM) problem
F11MDF	Real sparse nonsymmetric linear systems, setup for F11MEF
F11MEF	<i>LU</i> factorization of real sparse matrix
F11MFF	Solution of real sparse simultaneous linear equations (coefficient matrix already factorized)
F11MGF	Estimate condition number of real matrix, matrix already factorized by F11MEF
F11MHF	Refined solution with error bounds of real system of linear equations, multiple right-hand sides
F11MKF	Real sparse nonsymmetric matrix matrix multiply, compressed column storage
F11MLF	1-norm, ∞ -norm, largest absolute element, real general matrix
F11MMF	Real sparse nonsymmetric linear systems, diagnostic for F11MEF
F12AAF	Initialization routine for (F12ABF) computing selected eigenvalues and, optionally, eigenvectors of a real nonsymmetric sparse (standard or generalized) eigenproblem
F12ABF	Implements a reverse communication interface for the Implicitly Restarted Arnoldi iteration for computing selected eigenvalues and, optionally, eigenvectors of a real nonsymmetric sparse (standard or generalized) eigenproblem
F12ACF	Returns the converged approximations (as determined by F12ABF) to eigenvalues of a real nonsymmetric sparse (standard or generalized) eigenproblem and, optionally, the corresponding approximate eigenvectors and/or an orthonormal basis for the associated approximate invariant subspace
F12ADF	Set a single option from a string (F12ABF/F12ACF/F12AGF)
F12AEF	Provides monitoring information for F12ABF
F12AFF	Initialization routine for (F12AGF) computing selected eigenvalues and, optionally, eigenvectors of a real nonsymmetric banded (standard or generalized) eigenproblem
F12AGF	Computes approximations to selected eigenvalues of a real nonsymmetric banded (standard or generalized) eigenproblem and, optionally, the corresponding approximate eigenvectors and/or an orthonormal basis for the associated approximate invariant subspace
F12ANF	Initialization routine for (F12APF) computing selected eigenvalues and, optionally, eigenvectors of a complex sparse (standard or generalized) eigenproblem
F12APF	Implements a reverse communication interface for the Implicitly Restarted Arnoldi iteration for computing selected eigenvalues and, optionally, eigenvectors of a complex sparse (standard or generalized) eigenproblem
F12AQF	Returns the converged approximations (as determined by F12ABF) to eigenvalues of a complex sparse (standard or generalized) eigenproblem and, optionally, the corresponding approximate eigenvectors and/or an orthonormal basis for the associated approximate invariant subspace
F12ARF	Set a single option from a string (F12APF/F12AQF)
F12ASF	Provides monitoring information for F12APF
F12FAF	Initialization routine for (F12FBF) computing selected eigenvalues and, optionally, eigenvectors of a real symmetric sparse (standard or generalized) eigenproblem
F12FBF	Implements a reverse communication interface for the Implicitly Restarted Arnoldi iteration for computing selected eigenvalues and, optionally, eigenvectors of a real symmetric sparse (standard or generalized) eigenproblem

F12FCF	Returns the converged approximations (as determined by F12ABF) to eigenvalues of a real symmetric sparse (standard or generalized) eigenproblem and, optionally, the corresponding approximate eigenvectors and/or an orthonormal basis for the associated approximate invariant subspace
F12FDF	Set a single option from a string (F12FBF/F12FCF/F12FGF)
F12FEF	Provides monitoring information for F12FBF
F12FFF	Initialization routine for (F12FGF) computing selected eigenvalues and, optionally, eigenvectors of a real symmetric banded (standard or generalized) eigenproblem
F12FGF	Computes approximations to selected eigenvalues of a real symmetric banded (standard or generalized) eigenproblem and, optionally, the corresponding approximate eigenvectors and/or an orthonormal basis for the associated approximate invariant subspace
G01ETF	Landau distribution function $\Phi(\lambda)$
G01EUF	Vavilov distribution function $\Phi_V(\lambda; \kappa, \beta^2)$
G01FTF	Landau inverse function $\Psi(x)$
G01MTF	Landau density function $\phi(\lambda)$
G01MUF	Vavilov density function $\phi_V(\lambda; \kappa, \beta^2)$
G01PTF	Landau first moment function $\Phi_1(x)$
G01QTF	Landau second moment function $\Phi_2(x)$
G01RTF	Landau derivative function $\phi'(\lambda)$
G01ZUF	Initialization routine for G01MUF and G01EUF
G02EFF	Stepwise linear regression
G02JAF	Linear mixed effects regression using Restricted Maximum Likelihood (REML)
G02JBF	Linear mixed effects regression using Maximum Likelihood (ML)
G05LXF	Generates a matrix of random numbers from a multivariate Student's t -distribution, seeds and generator passed explicitly
G05LYF	Generates a matrix of random numbers from a multivariate Normal distribution, seeds and generator passed explicitly
G05RAF	Generates a matrix of random numbers from a Gaussian Copula, seeds and generator passed explicitly
G05RBF	Generates a matrix of random numbers from a Student's t -Copula, seeds and generator passed explicitly
G05YCF	Initializes the Faure generator (G05YDF/G05YJF/G05YKF)
G05YDF	Generates a sequence of quasi-random numbers using Faure's method
G05YEF	Initializes the Sobol generator (G05YFF/G05YJF/G05YKF)
G05YFF	Generates a sequence of quasi-random numbers using Sobol's method
G05YGF	Initializes the Neiderreiter generator (G05YHF/G05YJF/G05YKF)
G05YHF	Generates a sequence of quasi-random numbers using Neiderreiter's method
G05YJF	Generates a Normal quasi-random number sequence using Faure's, Sobol's or Neiderreiter's method
G05YKF	Generates a log-Normal quasi-random number sequence using Faure's, Sobol's or Neiderreiter's method
S14AGF	Logarithm of the Gamma function $\ln \Gamma(z)$
S18GKF	Bessel function of the 1st kind $J_{\alpha \pm n}(z)$

3 Withdrawn Routines

The following routines have been withdrawn from the Fortran Library at Mark 21. Warning of their withdrawal was included in the Mark 20 Library Manual, together with advice on which routines to use instead. See the document 'Advice on Replacement Calls for Withdrawn/Superseded Routines' for more detailed guidance.

Withdrawn

Routine	Replacement Routine(s)
F11BAF	F11BDF
F11BBF	F11BEF
F11BCF	F11BFF

4 Routines Scheduled for Withdrawal

The routines listed below are scheduled for withdrawal from the Fortran Library, because improved routines have now been included in the Library. Users are advised to stop using routines which are scheduled for withdrawal immediately and to use recommended replacement routines instead. See the document 'Advice on Replacement Calls for Withdrawn/Superseded Routines' for more detailed guidance, including advice on how to change a call to the old routine into a call to its recommended replacement.

The following routines will be withdrawn at Mark 22.

Routine Scheduled for Withdrawal	Replacement Routine(s)
E04UNF	E04USF/E04USA
F11GAF	F11GDF
F11GBF	F11GEF
F11GCF	F11GFF
G05CAF	G05KAF
G05CBF	G05KBF
G05CCF	G05KCF
G05CFF	F06DFF
G05CGF	F06DFF
G05DAF	G05LGF
G05DBF	G05LJF
G05DCF	G05LNF
G05DDF	G05LAF
G05DEF	G05LKF
G05DFF	G05LLF
G05DHF	G05LCF
G05DJF	G05LBF
G05DKF	G05LDF
G05DPF	G05LMF
G05DRF	G05MEF
G05DYF	G05MAF
G05DZF	G05KEF
G05EAF	G05LZF
G05EBF	G05MAF
G05ECF	G05MKF
G05EDF	G05MJF
G05EEF	G05MCF
G05EFF	G05MLF
G05EGF	G05PAF
G05EHF	G05NAF
G05EJF	G05NBF
G05EWF	G05PAF
G05EXF	G05MZF
G05EYF	G05MZF
G05EZF	G05LZF
G05FAF	G05LGF
G05FBF	G05LJF
G05FDF	G05LAF
G05FEF	G05LEF
G05FFF	G05LFF
G05FSF	G05LPF
G05GAF	G05QAF
G05GBF	G05QBF
G05HDF	G05PCF
G05ZAF	No replacement document required

The following routines have been superseded, but will not be withdrawn from the Library until Mark 23 at the earliest.

Superseded Routine	Replacement Routine(s)
E04NKF/E04NKA	E04NQF
E04NLF/E04NLA	E04NRF
E04NMF/E04NMA	E04NSF, E04NTF and E04NUF
E04UCF/E04UCA	E04WDF
E04UDF/E04UDA	E04WEF
E04UEF/E04UEA	E04WFF, E04WGF and E04WHF
E04UHF/E04UHA	E04VKF
E04UJF/E04UJA	E04VLF, E04VMF and E04VNF
F02BJF	F08WAF (DGGEV)
F02EAF	F08PAF (DGEES)
F02EBF	F08NAF (DGEEV)
F02FAF	F08FAF (DSYEV)
F02FCF	F08FBF (DSYEVX)
F02FDF	F08SAF (DSYGV)
F02FHF	F08UAF (DSBGV)
F02GAF	F08PNF (ZGEES)
F02GBF	F08NNF (ZGEEV)
F02GJF	F08WNF (ZGGEV)
F02HAF	F08FNF (ZHEEV)
F02HCF	F08FPF (ZHEEVX)
F02HDF	F08SNF (ZHEGV)
F02WEF	F08KBF (DGESVD)
F02XEF	F08KPF (ZGESVD)
F04AAF	F07AAF (DGESV)
F04ACF	F07HAF (DPBSV)
F04ADF	F07ANF (ZGESV)
F04ARF	F07AAF (DGESV)
F04EAF	F07CAF (DGTSV)
F04FAF	F07JAF (DPTSV)
F04JAF	F08KAF (DGELSS)
F04JDF	F08KAF (DGELSS)
F04JLF	F08ZBF (DGGGLM)
F04JMF	F08ZAF (DGGLSE)
F04KLF	F08ZPF (ZGGGLM)
F04KMF	F08ZNF (ZGGLSE)
G05YAF	G05YCF, G05YDF, G05YEF, G05YFF, G05YGF, G05YHF, G05YJF and G05YKF
G05YBF	G05YCF, G05YDF, G05YEF, G05YFF, G05YGF, G05YHF, G05YJF and G05YKF
