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COMPUTER ALGEBRA

AD: Automatic differentiation

HSL_AD02	[PDF] [Source]	Automatic differentiation

DIFFERENTIAL EQUATIONS

DA: Runge-Kutta methods for ordinary differential equation initial value problems

DA01	[PDF] [Source]	Gear's method, sparse Jacobian
DA02	[PDF] [Source]	Integrate ODE using Runge-Kutta

DC: Linear multi-step methods, predictor corrector methods for ordinary differential equation initial value problems

DC03	[PDF] [Source]	Ordinary differential equations: Gear's method, sparse Jacobian
DC04	[PDF] [Source]	Simplified calling sequence for DC03
DC05	[PDF] [Source]	Ordinary differential equations: Gear's method, reverse communication
HSL_DC05	[PDF] [Source]	Stiff differential-algebraic equations
DC06	[PDF] [Source]	Advances Ordinary differential equations: advances DC05 solution forward
DC07	[PDF] [Source]	Ordinary differential equations: Gear's method, full Jacobian

DD: Two-point boundary value ordinary differential equation problems

DD11	[PDF] [Source]	2-point boundary value problem, 2nd order linear ODE
DD12	[PDF] [Source]	2-point boundary value problem, 2nd order nonlinear ODE
DD14	[PDF] [Source]	Two-point boundary-value ordinary differential equation

DP: Parabolic partial differential equation problems

DP11	[PDF] [Source]	2-point boundary value problem, linear parabolic PDE
DP12	[PDF] [Source]	2-point boundary value problem, nonlinear parabolic PDE

EIGENVALUES AND EIGENVECTORS

EA Eigenvalues and eigenvectors of real symmetric matrices

EA02	[PDF] [Source]	Eigenvalue and vector nearest given estimate
EA06	[PDF] [Source]	Eigenvalues and vectors using QR
EA07	[PDF] [Source]	Eigenvalues using QR
EA08	[PDF] [Source]	Eigenvalues of a tridiagonal symmetric matrix using QR
EA09	[PDF] [Source]	Eigenvalues and vectors of a tridiagonal matrix using QR
EA11	[PDF] [Source]	Solves Ax = lambda Bx, with B positive definite
EA23	[PDF] [Source]	Full symmetric: Jacobi's method

EB: Eigenvalues and eigenvectors of real general matrices

EB06	[PDF] [Source]	Eigenvalues and vectors of a real matrix using QR
EB07	[PDF] [Source]	Eigenvalues of a real matrix using QR
EB08	[PDF] [Source]	Eigenvalues and vectors of a real upper Hessenberg matrix using QR
EB09	[PDF] [Source]	Eigenvalues of a real upper Hessenberg matrix using QR
EB10	[PDF] [Source]	Singular value decomposition of a real matrix

EC: Eigenvalues and eigenvectors of Hermitian matrices

EC06	[PDF] [Source]	Eigenvalues and vectors of a complex Hermitian matrix using QR
EC07	[PDF] [Source]	Eigenvalues of a Hermitian matrix using QR
EC08	[PDF] [Source]	Eigenvalues and vectors of a Hermitian tridiagonal matrix using QR
EC09	[PDF] [Source]	Eigenvalues of a Hermitian tridiagonal matrix using QR
EC12	[PDF] [Source]	Eigenvalues and vectors of a Hermitian tridiagonal matrix using Sturm sequences
EC23	[PDF] [Source]	Full Hermitian matrix: classical Jacobi's method

MATHEMATICAL FUNCTIONS

FA: Random numbers

FA01	[PDF] [Source]	Uniformly distributed pseudo-random numbers
FA04	[PDF] [Source]	Uniform distribution
HSL_FA04	[PDF] [Source]	Uniform distribution

FA05 [PDF] [Source] Pseudo-random numbers from the normal distribution
FA06 [PDF] [Source] Pseudo-random numbers from the gamma distribution

FB: Elliptic integrals

FB01 [PDF] [Source] Complete elliptic integrals, 1st and 2nd kind
FB02 [PDF] [Source] Incomplete elliptic integrals, 1st and 2nd kind
FB03 [PDF] [Source] Complete elliptic integrals, 3rd kind

FC: Error function, gamma function, exponential integrals and related functions

FC01 [PDF] [Source] Complex error function
FC03 [PDF] [Source] Real gamma function
FC05 [PDF] [Source] Beta function
FC07 [PDF] [Source] Complementary error function
FC08 [PDF] [Source] Real error function
FC10 [PDF] [Source] Complex Fresnel integral
FC11 [PDF] [Source] Exponential integral
FC12 [PDF] [Source] Complex plasma dispersion function
FC13 [PDF] [Source] Dawson's integral
FC14 [PDF] [Source] Real gamma function
FC15 [PDF] [Source] Log modulus of the complex gamma function
FC16 [PDF] [Source] Plasma dispersion function

FD: Simple functions

FD05 [PDF] [Source] Real-valued machine constant
FD15 [PDF] [Source] Real-valued machine constant

FF: Bessel functions

FF01 [PDF] [Source] Bessel functions J0 and Y0
FF02 [PDF] [Source] Bessel functions J1 and Y1
FF03 [PDF] [Source] Bessel functions I0 and K0
FF04 [PDF] [Source] Bessel functions I1 and K1
FF05 [PDF] [Source] Spherical Bessel functions
FF06 [PDF] [Source] Bessel functions: ber, bei, ker, kei, etc.
FF07 [PDF] [Source] Bessel functions Inu and Knu

FG: Functions associated with Quantum Physics

FG01 [PDF] [Source] Wigner, Clebsch-Gordan and Racah coefficients, Jahn's U function

FP: Supplementary calculations for graph plotting

FP01 [PDF] [Source] Axis limits, label points and label formats, given data limits

FT: Fourier transforms

FT01 [PDF] [Source] Discrete Fourier transforms

GEOMETRICAL PROBLEMS

GA Transformation of co-ordinates and areas of contours

GA01 [PDF] [Source] Convert cartesian to spherical coordinates
GA02 [PDF] [Source] Area bounded by contour and side(s) of a triangle
GA03 [PDF] [Source] Areas between successive contours
GA04 [PDF] [Source] Solid angle subtended by a disc of unit radius
GA06 [PDF] [Source] Triangulate arbitrary set of points in a plane
GA15 [PDF] [Source] Test if a point is inside a two-dimensional region

INTEGER VALUED FUNCTIONS

IC: Character string manipulation functions

IC01 [PDF] [Source] Locate first occurrence of the character in a string
IC02 [PDF] [Source] Compare two character strings

ID: Simple integer functions

ID02 [PDF] [Source] Computes the H.C.F. of two integers
ID03 [PDF] [Source] Seconds elapsed between two given times
ID05 [PDF] [Source] Integer-valued machine constants

IM: Integer functions for matrices

IM01 [PDF] [Source] Part of MA32

SORTING

KB: Sorting numbers, sorting text, sorting tables

KB09 [PDF] [Source] Sort a table of records using a sort-key field
KB10 [PDF] [Source] Sort and subsort a table of records using sort-key fields
KB12 [PDF] [Source] Sorting 1st k from m without a priori knowledge of k
KB21 [PDF] [Source] Sort n numbers from an array of m numbers

KC: Sorting and merging intervals on the real line

KC01 [PDF] [Source] Disjoint intervals that are the union of a given set
KC02 [PDF] [Source] Merge two sets of intervals to smallest non-overlapping set

KD: Hashing and searching

KD01 [PDF] [Source] Set and maintain a dictionary of words for hashing

LINEAR PROGRAMMING

LA: Linear programming, i.e. minimization of a linear function subject to linear constraints

LA01 [PDF] [Source] Linear programming with the revised simplex method
LA02 [PDF] [Source] Find a feasible point to a set of linear constraints

LINEAR ALGEBRA

MA Solution of linear equations, also inverses and determinants

MA01 [PDF] [Source] Solves with one or more RHS, simple Gaussian elimination
MA08 [PDF] [Source] Form the normal equations for linear least squares
MA09 [PDF] [Source] Solve linear least squares using normal equations
MA10 [PDF] [Source] Solve symmetric positive definite systems using Cholesky
MA11 [PDF] [Source] Solve an overdetermined system in the minimax sense
MA12 [PDF] [Source] Solves an upper Hessenberg system using Gaussian elimination
MA19 [PDF] [Source] Minimax solution of a system subject to simple bounds
MA20 [PDF] [Source] Solves an overdetermined system in the L1 sense
MA21 [PDF] [Source] Solution, inversion, determinant, scaling and iterative refinement
MA22 [PDF] [Source] As MA21 but for symmetric positive definite systems
MA24 [PDF] [Source] As MA21 but for Hermitian positive definite systems
MA25 [PDF] [Source] Minimax solution to a system subject to simple bounds
MA26 [PDF] [Source] Solve symmetric positive-definite tridiagonal system, Cholesky
MA27 [PDF] [Source] Solve sparse symmetric system, not necessarily positive definite
MA28 [PDF] [Source] Factorize and solve sparse system of linear equations
MA29 [PDF] [Source] Factorize and solve symmetric system of linear equations
MA30 [PDF] [Source] Perform LU decomposition of a sparse matrix
MA32 [PDF] [Source] Solve sparse system using frontal method
MA33 [PDF] [Source] Perform LU decomposition of a sparse, possibly rectangular matrix
MA35 [PDF] [Source] Solve a band structured system of linear equations
MA36 [PDF] [Source] Solve symmetric positive definite band system
MA37 [PDF] [Source] Solve a sparse system, symmetric or nearly symmetric
MA47 [PDF] [Source] Solve sparse symmetric indefinite system of linear equations

MB: Inverses of matrices, also determinants, adjoints and generalized inverses

MB01 [PDF] [Source] Inverse of a real matrix using Gaussian elimination
MB04 [PDF] [Source] Given a matrix and its inverse, finds inverse of leading submatrix
MB05 [PDF] [Source] Given a matrix and inverse of its leading submatrix, finds its inverse
MB10 [PDF] [Source] Generalized inverse of a rectangular matrix
MB11 [PDF] [Source] Generalized inverse of a rectangular matrix of full rank

MC: Computations with real matrices and vectors

MC04 [PDF] [Source] Householder transformation of symmetrical matrix to tridiagonal
MC06 [PDF] [Source] Apply Gram-Schmidt orthogonalization to vectors
MC09 [PDF] [Source] Sparse matrix-vector product
MC11 [PDF] [Source] Rank-1 update to positive definite matrix
MC14 [PDF] [Source] Transform real matrix to upper Hessenberg form
MC15 [PDF] [Source] Scale rows and columns to balance matrix elements
MC16 [PDF] [Source] Append n+1 vector to n by n triangular matrix
MC17 [PDF] [Source] Delete a column from an n by n triangular matrix
MC18 [PDF] [Source] Compute Householder transformation of symmetric matrix
MC19 [PDF] [Source] Sparse unsymmetric matrix: calculate scaling factors
MC20 [PDF] [Source] Sort a sparse matrix to an ordering by columns
MC24 [PDF] [Source] Bound on largest element of sparse matrix during Gaussian elimination
MC27 [PDF] [Source] Downdate factorization of positive definite symmetric matrix
MC31 [PDF] [Source] Part of MA32
MC32 [PDF] [Source] Part of MA32
MC36 [PDF] [Source] Read sparse matrix in Harwell-Boeing format from an i/o stream
MC39 [PDF] [Source] Sort a sparse matrix to an ordering by columns
MC40 [PDF] [Source] Symmetric permutation that reduces profile of sparse matrix with a symmetric sparsity pattern
MC43 [PDF] [Source] Ordering for finite element matrix, for frontal solver
MC49 [PDF] [Source] Sort a sparse matrix to an ordering by columns
MC52 [PDF] [Source] Write sparse matrix in Harwell-Boeing format to an i/o stream
MC54 [PDF] [Source] Write a sparse matrix in Rutherford-Boeing format
MC55 [PDF] [Source] Write a supplementary file in Rutherford-Boeing format
MC56 [PDF] [Source] Read a file or a supplementary file held in Rutherford-Boeing format

ME: Solution of complex linear equations and other calculations for complex matrices

ME05 [PDF] [Source] Solution, inversion, determinant and iterative refinement
ME08 [PDF] [Source] Reduce to tridiagonal Hermitian form
ME17 [PDF] [Source] Full unsymmetric matrix: calculate scaling factors
ME20 [PDF] [Source] Sort the nonzeros of a sparse complex matrix
ME24 [PDF] [Source] Bound on largest element of sparse matrix during Gaussian elimination
ME27 [PDF] [Source] Solve sparse Hermitian systems of linear equations
ME28 [PDF] [Source] Sparse unsymmetric: driver for conventional direct method

ME30	[PDF] [Source]	Sparse unsymmetric: conventional direct method
ME47	[PDF] [Source]	Solve sparse symmetric complex systems of linear equations

MF: Computations with complex matrices and vectors

MF36	[PDF] [Source]	Read sparse complex matrix in Harwell-Boeing format from an i/o stream
MF49	[PDF] [Source]	Sort a sparse matrix to an ordering by columns

NONLINEAR EQUATIONS

NB: Solution of a single nonlinear equation in one unknown

NB01	[PDF] [Source]	Real zero of a continuous function of one variable
NB02	[PDF] [Source]	Real zero of a continuous function of one variable

NS: Solution of systems of nonlinear equations in several unknowns

NS11	[PDF] [Source]	Solve a system of nonlinear equations, Broyden's method
NS12	[PDF] [Source]	Sparse nonlinear equations: Powell dog-leg algorithm

INPUT AND OUTPUT AIDS

OA: Printing arrays in tabular form

OA01	[PDF] [Source]	Print out the elements of a matrix
OA02	[PDF] [Source]	Print a single dimensioned array in tabular form
OA03	[PDF] [Source]	Print two single dimensioned arrays in tabular form

OB: Subroutines generating output for the graph plotter

OB11	[PDF] [Source]	Draw smooth, tangentially continuous curve, given sequence of points
OB12	[PDF] [Source]	Draw a cubic spline
OB13	[PDF] [Source]	Plot the part of a conic section that is inside a given triangle
OB14	[PDF] [Source]	Contours of a function, values specified over regular rectangular

OC: Graphical output for the line printer or terminal

OC02	[PDF] [Source]	Print graph on the line printer or teletype

OE: Source and text editing facilities

OE08	[PDF] [Source]	Maintain different source versions in one master file
OE09	[PDF] [Source]	Construct a master file for OE08
OE10	[PDF] [Source]	Source editor for card image files
OE12	[PDF] [Source]	Fortran profiler, inserts statements to count executions
OE15	[PDF] [Source]	Compares two files containing fixed length records
OE16	[PDF] [Source]	Performs partial analysis of a Fortran 77 statement
OE17	[PDF] [Source]	To count and time subroutine calls during execution

OF: Direct access data set management

OF01	[PDF] [Source]	Provide in-core buffering for direct access i/o

POLYNOMIAL AND RATIONAL FUNCTIONS

PA: Zeros of polynomials

PA02	[PDF] [Source]	Find all real roots, real coefficients, Sturm's sequences
PA03	[PDF] [Source]	Find all the roots of a cubic polynomial
PA04	[PDF] [Source]	Number of real roots above, below and within a given interval
PA05	[PDF] [Source]	Find all the roots of a quartic polynomial

PB: Evaluation of polynomials

PB01	[PDF] [Source]	Real value of a real polynomial
PB02	[PDF] [Source]	Complex value of a real polynomial

PC Generating coefficients of polynomials

PC01	[PDF] [Source]	Calculate the coefficients given the roots
PC02	[PDF] [Source]	Given n+1 points, get coefficients of interpolating polynomial

PD: Functions of polynomials

PD02	[PDF] [Source]	Taylor's series expansion of polynomial reciprocal
PD03	[PDF] [Source]	New coefficients on a change of variable
PD04	[PDF] [Source]	Quotient on dividing a polynomial by a linear factor
PD05	[PDF] [Source]	Taylor series expansion of log [A(x)]
PD06	[PDF] [Source]	Taylor series expansion of exp [A(x)]
PD07	[PDF] [Source]	Taylor series expansions of sin [A(x)] and cos [A(x)]
PD08	[PDF] [Source]	Taylor series expansion of a power of [A(x)]
PD09	[PDF] [Source]	Taylor series expansion of A(x)B(x)
PD10	[PDF] [Source]	Taylor series expansion of A(x)/B(x)

PE: Polynomial and rational approximations, orthogonal polynomials

PE01	[PDF] [Source]	Given polynomial expressed in terms of Chebyshev polynomials,
PE02	[PDF] [Source]	Evaluate polynomial expressed in terms of Chebyshev polynomials
PE03	[PDF] [Source]	Given a polynomial obtain its expansion in terms of Chebyshev polynomials
PE04	[PDF] [Source]	Finds a rational approximation of a function
PE06	[PDF] [Source]	Finds the Pade_ approximation of a polynomial
PE07	[PDF] [Source]	Value of polynomial expressed as linear combination of orthogonal polynomials
PE08	[PDF] [Source]	Coefficients of polynomial expressed as linear combination of orthogonal polynomials
PE09	[PDF] [Source]	Value, 1st and 2nd derivative of polynomial expressed as linear combination of orthogonal polynomials

PE11	[PDF] [Source]	Minimax polynomial approximation to a function over a set of points
PE12	[PDF] [Source]	Converts polynomial in terms of orthogonal polynomials to one in terms of Chebyshev polynomials

NUMERICAL INTEGRATION

QA Integrals of functions of one variable

QA01	[PDF] [Source]	Integrate using Newton-Coates formulae
QA02	[PDF] [Source]	Integrate using variable step Simpson's rule
QA03	[PDF] [Source]	Tabulate an integral function using variable step Simpson's rule
QA04	[PDF] [Source]	Integrate to specified accuracy using adaptive Gaussian Integration
QA05	[PDF] [Source]	Integrate using Romberg extrapolation and Trapezoidal rule

QB: Multi-dimensional integration of functions of several variables

QB01	[PDF] [Source]	Evaluate a multi-dimensioned integral

QC: One-dimensional infinite integrals

QC02	[PDF] [Source]	Provide weights and zeros for Gaussian type quadratures

QD: Integration of trigonometric and related functions

QD01	[PDF] [Source]	Integrals of f(t) sin xt and f(t) cos xt

QG: Integration of spline functions

QG01	[PDF] [Source]	Integrate cubic spline between knot point limits
QG02	[PDF] [Source]	Integrate cubic spline between general limits
QG03	[PDF] [Source]	Integrate product of a Gaussian exponential and a piecewise linear function
QG04	[PDF] [Source]	Integrate (Gaussian exponential) (cubic spline) product

QM: Estimation of integrals by Monte Carlo methods

QM01	[PDF] [Source]	Multi-dimensional integration using Monte Carlo method

STATISTICS

SA: Probability functions

SA01	[PDF] [Source]	Evaluate cumulative chi-squared probability function
SA02	[PDF] [Source]	Evaluate Student's t distribution
SA03	[PDF] [Source]	Evaluate the complement of cumulative distribution function

SV: Extraction of statistical information from data fitting subroutines

SV02	[PDF] [Source]	Assess which parameters are well determined after nonlinear least-squares fit

INTERPOLATION AND APPROXIMATION

TA: Generating and printing finite differences

TA01	[PDF] [Source]	Given function values produce a table of finite differences
TA02	[PDF] [Source]	Given function values calculate divided differences
TA03	[PDF] [Source]	Given function values calculate central differences

TB Interpolation by polynomials and spline functions

TB01	[PDF] [Source]	**Interpolate the value of an even function**
TB02	[PDF] [Source]	Interpolate the value of a function
TB03	[PDF] [Source]	Coefficients of piecewise cubic function
TB04	[PDF] [Source]	Cubic spline that interpolates given function values
TB06	[PDF] [Source]	Cubic spline interpolation as sum of B-splines
TB07	[PDF] [Source]	Optimal spline interpolation as sum of B-splines
TB08	[PDF] [Source]	Computes knots of optimal spline interpolation
TB15	[PDF] [Source]	Periodic spline that interpolates given function values

TC: Inverse interpolation

TC01	[PDF] [Source]	Inverse interpolation for a cubic spline

TD: Estimation of derivatives by finite differences

TD01	[PDF] [Source]	Estimate 1st or 2nd derivatives given finite differences
TD03	[PDF] [Source]	Approximate Hessian matrix using finite differences
TD12	[PDF] [Source]	Approximate Jacobian matrix using finite differences
TD22	[PDF] [Source]	Approximate Jacobian matrix using finite differences

TG: Evaluation of spline functions

TG01	[PDF] [Source]	Value of a cubic spline expressed by values and derivatives at knots
TG02	[PDF] [Source]	Value and derivatives of a cubic spline expressed by values and derivatives at knots
TG03	[PDF] [Source]	Value and derivatives of a spline expressed as a sum of B-splines
TG04	[PDF] [Source]	Values and integrals of B-splines over a given set of knots

TS: Approximation of functions by spline functions

TS01	[PDF] [Source]	Cubic spline approximation to a given smooth function

OPTIMIZATION AND NONLINEAR DATA FITTING

VA: Minimization of general functions and sums of squares of functions of several variables

VA05	[PDF] [Source]	Minimize a sum of squares, derivatives not needed
VA06	[PDF] [Source]	Minimum of a general function, derivatives required
VA08	[PDF] [Source]	Minimize a function of several variables: Fletcher-Reeves method
VA09	[PDF] [Source]	Minimum of a general function, derivatives required
VA10	[PDF] [Source]	Minimum of general function, differentiable but derivatives not required
VA13	[PDF] [Source]	Minimum of general function, BFGS variable metric method

VA21 [PDF] [Source] Minimum of general function when 1st and 2nd derivatives available
VA23 [PDF] [Source] The VA24 method with user control at a basic level
VA24 [PDF] [Source] Minimum of general function, no derivatives
VA27 [PDF] [Source] Minimize a sum of squares, derivatives required, Marquardt method
VA34 [PDF] [Source] Minimize a function of a huge number of variables: conjugate gradients
VA35 [PDF] [Source] Minimize a function: limited-memory BFGS method

VB: Nonlinear data fitting, minimization of sums of squares of functions and data fitting by spline functions

VB01 [PDF] [Source] Least squares fit to given data, Marquardt method
VB05 [PDF] [Source] Best weighted least squares fit by a cubic spline
VB06 [PDF] [Source] Similar to VB05 but with imposed smoothing conditions
VB13 [PDF] [Source] Minimize a sum of squares of n functions, derivatives required

VC: Data fitting by polynomials and spline functions

VC03 [PDF] [Source] Smooth weighted least squares fit to given data by cubic spline
VC04 [PDF] [Source] Least squares fit of a straight line to data
VC11 [PDF] [Source] Calculate best weighted least squares fit by a polynomial
VC15 [PDF] [Source] Calculate weighted least squares fit by a sum of n decaying exponentials

VD: Minimization of a function of one variable

VD01 [PDF] [Source] Minimize general function, no derivative, specified accuracy
VD02 [PDF] [Source] Minimize general function, derivatives required
VD03 [PDF] [Source] Find point on given curve nearest to given point
VD04 [PDF] [Source] Minimize a smooth function

VE: Minimization of a general function subject to linear constraints

VE01 [PDF] [Source] Minimize a general function, linear constraints, Davidon's method
VE02 [PDF] [Source] Minimize a quadratic function, linear constraints
VE03 [PDF] [Source] Minimize a general function, linear and simple bounds
VE04 [PDF] [Source] Minimize quadratic function, bounds on the variables
VE07 [PDF] [Source] Solves a convex quadratic programming problem
VE08 [PDF] [Source] Minimize a sum of finite-element functions
VE10 [PDF] [Source] Minimize a sum of squares of element functions
VE11 [PDF] [Source] Minimize a differentiable function, linear constraints and bounds
VE17 [PDF] [Source] Solve convex quadratic programming problem, linear constraints

VF: Minimization of a general function subject to nonlinear constraints

VF01 [PDF] [Source] Minimize a general function, general constraints, exact augmented Lagrangian method
VF04 [PDF] [Source] Minimize general function, general constraints, augmented Lagrangian method
VF13 [PDF] [Source] Minimize a general function, general constraints, SQP method

VG: Nonlinear minimax minimization

VG11 [PDF] [Source] Minimax solution of nonlinear equations, derivatives required
VG12 [PDF] [Source] Minimax solution of nonlinear equations, derivatives not required

VH: Minimization of functions of integer variables

HSL_VH01 [PDF] [Source] Genetic algorithm for the smallest value of a function of binary variables

TEST PROGRAM GENERATORS

YM: Generate test programs for chapter M of the library

YM01 [PDF] [Source] Generate a random sparse matrix

FORTRAN SYSTEM FACILITIES

ZA: Timing, machine constants, etc

ZA02 [PDF] [Source] CPU time
HSL_ZA03 [PDF] [Source] Kind values for 1- and 2-byte Fortran 90 logicals
ZA12 [PDF] [Source] CPU time

ZD: Derived types

HSL_ZD01 [PDF] [Source] Derived type for a variety of sparse matrix storage schemes

ZE: Estimation of rounding errors

ZE01 [PDF] [Source] Estimate rounding errors generated in floating point arithmetic
ZE02 [PDF] [Source] Generate machine dependent constants for ID05 and FD05