

NAG Library Chapter Contents

F01 – Matrix Operations, Including Inversion

F01 Chapter Introduction

| Routine Name | Mark of Introduction | Purpose |
|--------------|----------------------|---|
| F01ABF | 1 | nagf_matop_real_symm_posdef_inv Inverse of real symmetric positive definite matrix using iterative refinement |
| F01ADF | 2 | nagf_matop_real_symm_posdef_inv_noref Inverse of real symmetric positive definite matrix |
| F01BLF | 5 | nagf_matop_real_gen_pseudinv Pseudo-inverse and rank of real m by n matrix ($m \geq n$) |
| F01BRF | 7 | nagf_matop_real_gen_sparse_lu LU factorization of real sparse matrix |
| F01BSF | 7 | nagf_matop_real_gen_sparse_lu_reuse LU factorization of real sparse matrix with known sparsity pattern |
| F01BUF | 7 | nagf_matop_real_symm_posdef_fac $ULDL^T U^T$ factorization of real symmetric positive definite band matrix |
| F01BVF | 7 | nagf_matop_real_symm_posdef_geneig Reduction to standard form, generalized real symmetric-definite banded eigenproblem |
| F01CKF | 2 | nagf_matop_real_gen_matmul Multiplication of real matrices |
| F01CRF | 7 | nagf_matop_real_gen_trans_inplace Transposition of a real matrix |
| F01CTF | 14 | nagf_matop_real_addsub Sum or difference of two real matrices, optional scaling and transposition |
| F01CWF | 14 | nagf_matop_complex_addsub Sum or difference of two complex matrices, optional scaling and transposition |
| F01ECF | 22 | nagf_matop_real_gen_matrix_exp Real matrix exponential |
| F01EDF | 23 | nagf_matop_real_symm_matrix_exp Real symmetric matrix exponential |
| F01EFF | 23 | nagf_matop_real_symm_matrix_fun Function of a real symmetric matrix |
| F01EJF | 24 | nagf_matop_real_gen_matrix_log Real matrix logarithm |
| F01EKF | 24 | nagf_matop_real_gen_matrix_fun_std Exponential, sine, cosine, sinh or cosh of a real matrix (Schur–Parlett algorithm) |
| F01ELF | 24 | nagf_matop_real_gen_matrix_fun_num Function of a real matrix (using numerical differentiation) |
| F01EMF | 24 | nagf_matop_real_gen_matrix_fun_usd Function of a real matrix (using user-supplied derivatives) |
| F01ENF | 25 | nagf_matop_real_gen_matrix_sqrt Real matrix square root |
| F01EPF | 25 | nagf_matop_real_tri_matrix_sqrt Real upper quasi-triangular matrix square root |

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| F01EQF | 25 | nagf_matop_real_gen_matrix_pow General power of a real matrix |
| F01FCF | 23 | nagf_matop_complex_gen_matrix_exp Complex matrix exponential |
| F01FDF | 23 | nagf_matop_complex_herm_matrix_exp Complex Hermitian matrix exponential |
| F01FFF | 23 | nagf_matop_complex_herm_matrix_fun Function of a complex Hermitian matrix |
| F01FJF | 24 | nagf_matop_complex_gen_matrix_log Complex matrix logarithm |
| F01FKF | 24 | nagf_matop_complex_gen_matrix_fun_std Exponential, sine, cosine, sinh or cosh of a complex matrix (Schur–Parlett algorithm) |
| F01FLF | 24 | nagf_matop_complex_gen_matrix_fun_num Function of a complex matrix (using numerical differentiation) |
| F01FMF | 24 | nagf_matop_complex_gen_matrix_fun_usd Function of a complex matrix (using user-supplied derivatives) |
| F01FNF | 25 | nagf_matop_complex_gen_matrix_sqrt Complex matrix square root |
| F01FPF | 25 | nagf_matop_complex_tri_matrix_sqrt Complex upper triangular matrix square root |
| F01FQF | 25 | nagf_matop_complex_gen_matrix_pow General power of a complex matrix |
| F01GAF | 24 | nagf_matop_real_gen_matrix_actexp Action of a real matrix exponential on a real matrix |
| F01GBF | 24 | nagf_matop_real_gen_matrix_actexp_rcomm Action of a real matrix exponential on a real matrix (reverse communication) |
| F01HAF | 24 | nagf_matop_complex_gen_matrix_actexp Action of a complex matrix exponential on a complex matrix |
| F01HBF | 24 | nagf_matop_complex_gen_matrix_actexp_rcomm Action of a complex matrix exponential on a complex matrix (reverse communication) |
| F01JAF | 24 | nagf_matop_real_gen_matrix_cond_std Condition number for the exponential, logarithm, sine, cosine, sinh or cosh of a real matrix |
| F01JBF | 24 | nagf_matop_real_gen_matrix_cond_num Condition number for a function of a real matrix (using numerical differentiation) |
| F01JCF | 24 | nagf_matop_real_gen_matrix_cond_usd Condition number for a function of a real matrix (using user- supplied derivatives) |
| F01JDF | 25 | nagf_matop_real_gen_matrix_cond_sqrt Condition number for square root of real matrix |
| F01JEF | 25 | nagf_matop_real_gen_matrix_cond_pow Condition number for real matrix power |
| F01JFF | 25 | nagf_matop_real_gen_matrix_frcht_pow Fréchet derivative of real matrix power |
| F01JGF | 25 | nagf_matop_real_gen_matrix_cond_exp Condition number for real matrix exponential |
| F01JHF | 25 | nagf_matop_real_gen_matrix_frcht_exp Fréchet derivative of real matrix exponential |
| F01JJF | 25 | nagf_matop_real_gen_matrix_cond_log Condition number for real matrix logarithm |
| F01JKF | 25 | nagf_matop_real_gen_matrix_frcht_log Fréchet derivative of real matrix logarithm |
| F01KAF | 24 | nagf_matop_complex_gen_matrix_cond_std Condition number for the exponential, logarithm, sine, cosine, sinh or cosh of a complex matrix |

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| F01KBF | 24 | nagf_matop_complex_gen_matrix_cond_num Condition number for a function of a complex matrix (using numerical differentiation) |
| F01KCF | 24 | nagf_matop_complex_gen_matrix_cond_usd Condition number for a function of a complex matrix (using user-supplied derivatives) |
| F01KDF | 25 | nagf_matop_complex_gen_matrix_cond_sqrt Condition number for square root of complex matrix |
| F01KEF | 25 | nagf_matop_complex_gen_matrix_cond_pow Condition number for complex matrix power |
| F01KFF | 25 | nagf_matop_complex_gen_matrix_frcht_pow Fréchet derivative of complex matrix power |
| F01KGF | 25 | nagf_matop_complex_gen_matrix_cond_exp Condition number for complex matrix exponential |
| F01KHF | 25 | nagf_matop_complex_gen_matrix_frcht_exp Fréchet derivative of complex matrix exponential |
| F01KJF | 25 | nagf_matop_complex_gen_matrix_cond_log Condition number for complex matrix logarithm |
| F01KKF | 25 | nagf_matop_complex_gen_matrix_frcht_log Fréchet derivative of complex matrix logarithm |
| F01LEF | 11 | nagf_matop_real_gen_tridiag_lu <i>LU</i> factorization of real tridiagonal matrix |
| F01LHF | 13 | nagf_matop_real_gen_blkdiag_lu <i>LU</i> factorization of real almost block diagonal matrix |
| F01MCF | 8 | nagf_matop_real_vband_posdef_fac <i>LDL</i> ^T factorization of real symmetric positive definite variable-bandwidth matrix |
| F01QGF | 14 | nagf_matop_real_trapez_rq <i>RQ</i> factorization of real m by n upper trapezoidal matrix ($m \leq n$) |
| F01QJF | 14 | nagf_matop_real_gen_rq <i>RQ</i> factorization of real m by n matrix ($m \leq n$) |
| F01QKF | 14 | nagf_matop_real_gen_rq_formq Operations with orthogonal matrices, form rows of Q , after <i>RQ</i> factorization by F01QJF |
| F01RGF | 14 | nagf_matop_complex_trapez_rq <i>RQ</i> factorization of complex m by n upper trapezoidal matrix ($m \leq n$) |
| F01RJF | 14 | nagf_matop_complex_gen_rq <i>RQ</i> factorization of complex m by n matrix ($m \leq n$) |
| F01RKF | 14 | nagf_matop_complex_gen_rq_formq Operations with unitary matrices, form rows of Q , after <i>RQ</i> factorization by F01RJF |
| F01VAF (DTRTTP) | 23 | DTRTTP nagf_matop_dtrttp Copies a real triangular matrix from full format to packed format |
| F01VBF (ZTRTTP) | 23 | ZTRTTP nagf_matop_ztrttp Copies a complex triangular matrix from full format to packed format |
| F01VCF (DTPTTR) | 23 | DTPTTR nagf_matop_dtptrr Copies a real triangular matrix from packed format to full format |
| F01VDF (ZTPTTR) | 23 | ZTPTTR nagf_matop_ztptrr Copies a complex triangular matrix from packed format to full format |

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| F01VEF (DTRTTF) | 23 | DTRTTF nagf_matop_dtrttf Copies a real triangular matrix from full format to Rectangular Full Packed format |
| F01VFF (ZTRTTF) | 23 | ZTRTTF nagf_matop_ztrttf Copies a complex triangular matrix from full format to Rectangular Full Packed format |
| F01VGF (DTFTTR) | 23 | DTFTTR nagf_matop_dtftr Copies a real triangular matrix from Rectangular Full Packed format to full format |
| F01VHF (ZTFTTR) | 23 | ZTFTTR nagf_matop_ztftr Copies a complex triangular matrix from Rectangular Full Packed format to full format |
| F01VJF (DTPPTF) | 23 | DTPPTF nagf_matop_dptptf Copies a real triangular matrix from packed format to Rectangular Full Packed format |
| F01VKF (ZTPPTF) | 23 | ZTPPTF nagf_matop_zptptf Copies a complex triangular matrix from packed format to Rectangular Full Packed format |
| F01VLF (DTFTTP) | 23 | DTFTTP nagf_matop_dfttpt Copies a real triangular matrix from Rectangular Full Packed format to packed format |
| F01VMF (ZTFTTP) | 23 | ZTFTTP nagf_matop_zfttpt Copies a complex triangular matrix from Rectangular Full Packed format to packed format |
| F01ZAF | 14 | nagf_matop_real_tri_pack Convert real matrix between packed triangular and square storage formats |
| F01ZBF | 14 | nagf_matop_complex_tri_pack Convert complex matrix between packed triangular and square storage formats |
| F01ZCF | 14 | nagf_matop_real_band_pack Convert real matrix between packed banded and rectangular storage formats |
| F01ZDF | 14 | nagf_matop_complex_band_pack Convert complex matrix between packed banded and rectangular storage formats |
