Appendix A. Basic Linear Algebra Subprograms (BLAS)

This appendix lists the ESSL subprograms corresponding to a subprogram in the standard set of BLAS.

Level 1 BLAS

Table 183. Level 1 BLAS Included in ESSL

Descriptive Name	Short- Precision Subprogram	Long- Precision Subprogram
Position of the First or Last Occurrence of the Vector Element Having the Largest Magnitude	ISAMAX ICAMAX	IDAMAX IZAMAX
Sum of the Magnitudes of the Elements in a Vector	SASUM SCASUM	DASUM DZASUM
Multiply a Vector X by a Scalar, Add to a Vector Y, and Store in the Vector Y	SAXPY CAXPY	DAXPY ZAXPY
Copy a Vector	SCOPY CCOPY	DCOPY ZCOPY
Dot Product of Two Vectors	SDOT CDOTU CDOTC	DDOT ZDOTU ZDOTC
Euclidean Length of a Vector with Scaling of Input to Avoid Destructive Underflow and Overflow	SNRM2 SCNRM2	DNRM2 DZNRM2
Construct a Givens Plane Rotation	SROTG CROTG	DROTG ZROTG
Apply a Plane Rotation	SROT CROT CSROT	DROT ZROT ZDROT
Multiply a Vector X by a Scalar and Store in the Vector X	SSCAL CSCAL CSSCAL	DSCAL ZSCAL ZDSCAL
Interchange the Elements of Two Vectors	SSWAP CSWAP	DSWAP ZSWAP

Level 2 BLAS

Table 184. Level 2 BLAS Included in ESSL

Descriptive Name	Short- Precision Subprogram	Long- Precision Subprogram
Matrix-Vector Product for a General Matrix, Its Transpose, or Its Conjugate Transpose	SGEMV CGEMV	DGEMV ZGEMV
Rank-One Update of a General Matrix	SGER CGERU CGERC	DGER ZGERU ZGERC
Matrix-Vector Product for a Real Symmetric or Complex Hermitian Matrix	SSPMV CHPMV SSYMV CHEMV	DSPMV ZHPMV DSYMV ZHEMV

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Table 184. Level 2 BLAS Included in ESSL (continued)

Descriptive Name	Short- Precision Subprogram	Long- Precision Subprogram
Rank-One Update of a Real Symmetric or Complex Hermitian Matrix	SSPR CHPR SSYR CHER	DSPR ZHPR DSYR ZHER
Rank-Two Update of a Real Symmetric or Complex Hermitian Matrix	SSPR2 CHPR2 SSYR2 CHER2	DSPR2 ZHPR2 DSYR2 ZHER2
Matrix-Vector Product for a General Band Matrix, Its Transpose, or Its Conjugate Transpose	SGBMV CGBMV	DGBMV ZGBMV
Matrix-Vector Product for a Real Symmetric or Complex Hermitian Band Matrix	SSBMV CHBMV	DSBMV ZHBMV
Matrix-Vector Product for a Triangular Matrix, Its Transpose, or Its Conjugate Transpose	STPMV CTPMV STRMV CTRMV	DTPMV ZTPMV DTRMV ZTRMV
Solution of a Triangular System of Equations with a Single Right-Hand Side	STPSV CTPSV STRSV CTRSV	DTPSV ZTPSV DTRSV ZTRSV
Matrix-Vector Product for a Triangular Band Matrix, Its Transpose, or Its Conjugate Transpose	STBMV CTBMV	DTBMV ZTBMV
Triangular Band Equation Solve	STBSV CTBSV	DTBSV ZTBSV

Level 3 BLAS

Table 185. Level 3 BLAS Included in ESSL

Descriptive Name	Short- Precision Subprogram	Long- Precision Subprogram
Combined Matrix Multiplication and Addition for General Matrices, Their Transposes, or Conjugate Transposes	SGEMM CGEMM	DGEMM ZGEMM
Matrix-Matrix Product Where One Matrix is Real or Complex Symmetric or Complex Hermitian	SSYMM CSYMM CHEMM	DSYMM ZSYMM ZHEMM
Triangular Matrix-Matrix Product	STRMM CTRMM	DTRMM ZTRMM
Rank-K Update of a Real or Complex Symmetric or a Complex Hermitian Matrix	SSYRK CSYRK CHERK	DSYRK ZSYRK ZHERK
Rank-2K Update of a Real or Complex Symmetric or a Complex Hermitian Matrix	SSYR2K CSYR2K CHER2K	DSYR2K ZSYR2K ZHER2K
Solution of Triangular Systems of Equations with Multiple Right-Hand Sides	STRSM CTRSM	DTRSM ZTRSM

Appendix B. LAPACK

This appendix contains the following two tables:

- Table 186 on page 1043
- Table 187 on page 1044

LAPACK Subroutines

The following table lists the ESSL subroutines corresponding to subroutines in the standard set of LAPACK.

Table 186. LAPACK subroutines included in ESSL

Descriptive Name	Short- Precision Subprogram	Long- Precision Subprogram
General Matrix Factorization and Multiple Right-Hand Side Solve	SGESV CGESV	DGESV ZGESV
General Matrix Factorization	SGETRF CGETRF	DGETRF ZGETRF
General Matrix, Its Transpose, or Its Conjugate Transpose Multiple Right-Hand Side Solve	SGETRS CGETRS	DGETRS ZGETRS
Positive Definite Real Symmetric Matrix Factorization and Multiple Right-Hand Side Solve	SPPSV CPPSV	DPPSV ZPPSV
Positive Definite Real Symmetric or Complex Hermitian Matrix Factorization and Multiple Right-Hand Side Solve	SPOSV CPOSV	DPOSV ZPOSV
Positive Definite Real Symmetric or Complex Hermitian Matrix Factorization	SPOTRF CPOTRF SPPTRF CPPTRF	DPOTRF ZPOTRF DPPTRF ZPPTRF
Positive Definite Real Symmetric or Complex Hermitian Matrix Multiple Right-Hand Side Solve	SPOTRS CPOTRS SPPTRS CPPTRS	DPOTRS ZPOTRS DPPTRS ZPPTRS
General Matrix Inverse	SGETRI CGETRI	DGETRI ZGETRI
Positive Definite Real Symmetric or Complex Hermitian Matrix Inverse	SPOTRI CPOTRI SPPTRI	DPOTRI ZPOTRI DPPTRI
Triangular Matrix Inverse	STRTRI STPTRI CTRTRI CTPTRI	DTRTRI DTPTRI ZTRTRI ZTPTRI
General Matrix QR Factorization		DGEQRF
Linear Least Squares Solution for a General Matrix		DGELS

Non–LAPACK-Conforming Subroutines

The following table lists each ESSL subroutine whose name is the same as an existing LAPACK subroutine, but whose calling-sequence arguments and functionality are different from that LAPACK subroutine.

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Table 187. Non-LAPACK subroutines included in ESSL whose names match existing LAPACK subroutines

Descriptive Name	Short- Precision Subroutine	Long- Precision Subroutine
Eigenvalues and, Optionally, All or Selected Eigenvectors of a General Matrix	SGEEV CGEEV	DGEEV ZGEEV
Eigenvalues and, Optionally, the Eigenvectors of a Real Symmetric Matrix or a Complex Hermitian Matrix	SSPEV CHPEV	DSPEV ZHPEV
Extreme Eigenvalues and, Optionally, the Eigenvectors of a Real Symmetric Matrix or a Complex Hermitian Matrix	SSPSV CHPSV	DSPSV ZHPSV
Eigenvalues and, Optionally, the Eigenvectors of a Generalized Real Eigensystem, Az=wBz, where A and B Are Real General Matrices	SGEGV	DGEGV
Eigenvalues and, Optionally, the Eigenvectors of a Generalized Real Symmetric Eigensystem, Az=wBz, where A Is Real Symmetric and B Is Real Symmetric Positive Definite	SSYGV	DSYGV