NAME

DSYEV - compute all eigenvalues and, optionally, eigenvectors of a real symmetric matrix A

SYNOPSIS

SUBROUTINE DSYEV(
                    JOBZ, UPLO, N, A, LDA, W, WORK, LWORK, INFO)

        CHARACTER
                JOBZ, UPLO

        INTEGER   INFO, LDA, LWORK, N

        DOUBLE   PRECISION A(LDA, *), W(*), WORK(*)

PURPOSE

DSYEV computes all eigenvalues and, optionally, eigenvectors of a real symmetric matrix A.

ARGUMENTS

JOBZ   (input) CHARACTER*1
        = 'N': Compute eigenvalues only;
        = 'V': Compute eigenvalues and eigenvectors.

UPLO   (input) CHARACTER*1
        = 'U': Upper triangle of A is stored;
        = 'L': Lower triangle of A is stored.

N   (input) INTEGER
        The order of the matrix A. N >= 0.

A   (input/output) DOUBLE PRECISION array, dimension (LDA, N)
        On entry, the symmetric matrix A. If UPLO = 'U', the leading N-by-N upper triangular part of A
        contains the upper triangular part of the matrix A. If UPLO = 'L', the leading N-by-N lower tri-
        angular part of A contains the lower triangular part of the matrix A. On exit, if JOBZ = 'V', then
        if INFO = 0, A contains the orthonormal eigenvectors of the matrix A. If JOBZ = 'N', then on
        exit the lower triangle (if UPLO='L') or the upper triangle (if UPLO='U') of A, including the
        diagonal, is destroyed.

LDA   (input) INTEGER
        The leading dimension of the array A. LDA >= max(1,N).

W   (output) DOUBLE PRECISION array, dimension (N)
        If INFO = 0, the eigenvalues in ascending order.

WORK   (workspace/output) DOUBLE PRECISION array, dimension (LWORK)
        On exit, if INFO = 0, WORK(1) returns the optimal LWORK.

LWORK   (input) INTEGER
        The length of the array WORK. LWORK >= max(1,3*N-1). For optimal efficiency, LWORK >=
        (NB+2)*N, where NB is the blocksize for DSYTRD returned by ILAENV.

        If LWORK = -1, then a workspace query is assumed; the routine only calculates the optimal size
        of the WORK array, returns this value as the first entry of the WORK array, and no error message
        related to LWORK is issued by XERBLA.

INFO   (output) INTEGER
        = 0: successful exit
        < 0: if INFO = -i, the i-th argument had an illegal value
        > 0: if INFO = i, the algorithm failed to converge; i off-diagonal elements of an intermediate
        tridiagonal form did not converge to zero.