See Also

Matrix Math Operations on page III-138 for more about Igor's matrix routines and for background references with details about the LAPACK libraries.

MatrixLUBkSub

MatrixLUBkSub ***matrtixL, matrixU, index, vectorB***

The MatrixLUBkSub operation provides back substitution for LU decomposition.

Details

This operation is used to solve the matrix equation Ax=b after you have performed LU decomposition (see **MatrixLUD**). Feed this routine M_Lower, M_Upper and W_LUPermutation from MatrixLUD along with your right-hand-side vector b. The solution vector x is returned as M_x. The array b can be a matrix containing a number of b vectors and the M_x will contain a corresponding set of solution vectors.

Generates an error if the dimensions of the input matrices are not appropriate.

See Also

Matrix Math Operations on page III-138 for more about Igor's matrix routines.

MatrixLUD

MatrixLUD [***flags***] ***matrixA***

The MatrixLUD operation computes the LU factorization of a matrix. The general form of the factorization/decomposition is expressed in terms of matrix products:

```
M_Pt x srcWave = M_Lower x M_Upper
```

M_Pt, M_Lower and M_Upper are outputs created by MatrixLUD.

M_Pt is the transpose of the permutation matrix, M_Lower is a lower triangular matrix with 1's on the main diagonal and M_Upper is an upper triangular (or trapezoidal) matrix.

The MatrixLUD operation was substantially changed in Igor Pro 7.00. See the /B flag for information about backward compatibility.

Flags

/B — This flag is provided for backward compatibility only; it is not compatible with any other flag. /B makes MatrixLUD behave as it did in Igor Pro 6. This flag is deprecated and will be removed in a future version of Igor.

The input is restricted to a 2D real valued, single or double precision square matrix. The outputs (all double precision) are stored in the waves M_Upper, M_Lower and W_LUPermutation in the current data folder.

The W_LUPermutation output wave was needed for solving a linear system of equations using the back substitution routine, **MatrixLUBkSub**. For better computation methods see **MatrixLinearSolve**, **MatrixLinearSolveTD** and **MatrixLLS**.

/CMF — Uses Combined Matrix Format where the upper and lower matrix factors are combined into a single matrix saved in the wave M_LUFactors in the current data folder. The upper matrix factor is constructed from the main and from the upper diagonals of M_LUFactors. The lower matrix factor is constructed from the lower diagonals of M_LUFactors and setting the main diagonal to 1.

/MIND — Finds the minimum magnitude diagonal element of M_Upper and store it in V_min. This is useful for investigating the behavior of the determinant of the matrix when it is close to being singular.

/PMAT — Saves the transpose of the permutation matrix in a double precision wave M_Pt in the current data folder. Note that the permutation matrix is orthogonal and so the inverse of the matrix is equal to its transpose.

/SUMP — Computes the sum of the phases of the elements on the main diagonal of M_Upper and store in the variable V_Sum. V_Sum is initialized to NaN and is set only if /SUMP is specified and M_Upper is complex.