

**NAME**

CUTESt\_ubandh\_threaded – CUTEst tool to extract a banded matrix from the Hessian matrix.

**SYNOPSIS**

CALL CUTESt\_ubandh\_threaded( status, n, X, nsemib, BANDH, lbandh, maxsbw, thread )

**DESCRIPTION**

The CUTESt\_ubandh\_threaded subroutine extracts the elements which lie within a band of given semi-bandwidth out of the Hessian matrix of the objective function of the problem decoded from a SIF file by the script *sifdecoder* at the point X.

The problem under consideration is to minimize or maximize an objective function  $f(x)$  over all  $x \in R^n$  subject to the simple bounds  $x^l \leq x \leq x^u$ . The objective function is group-partially separable.

**ARGUMENTS**

The arguments of CUTESt\_ubandh\_threaded are as follows

**status** [out] - integer

the output status: 0 for a successful call, 1 for an array allocation/deallocation error, 2 for an array bound error, 3 for an evaluation error, 4 for an out-of-range thread,

**n** [in] - integer

the number of variables for the problem,

**X** [in] - real/double precision

the derivatives will be evaluated at X.

**nsemib** [in] - integer

the required semi-bandwidth, i.e., the required number of bands directly below the diagonal of the Hessian.

**BANDH** [out] - real/double precision

a two-dimensional array of dimension (0:lbandh,n) which gives the lower triangular part of the band segment of the Hessian. The diagonal entry in column i is returned in location BANDH(0,i), while the entry j places below the diagonal in column i may be found in location BANDH(j,i),

**lbandh** [in] - integer

the actual declared size of the leading dimension of BANDH (with lbandh no smaller than nsemib). N.B. the leading component of BANDH includes the index 0 so strictly, the size of the leading dimension is lbandh + 1.

**maxsbw** [out] - integer

the actual semi-bandwidth, i.e., the actual number of bands directly below the diagonal of the Hessian.

**thread** [in] - integer

thread chosen for the evaluation; threads are numbered from 1 to the value threads set when calling CUTESt\_usetup\_threaded.

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**SEE ALSO**

*CUTEst: a Constrained and Unconstrained Testing Environment with safe threads,*

N.I.M. Gould, D. Orban and Ph.L. Toint,

Computational Optimization and Applications **60**:3, pp.545-557, 2014.

*CUTEr (and SifDec): A Constrained and Unconstrained Testing Environment, revisited,*

N.I.M. Gould, D. Orban and Ph.L. Toint,

ACM TOMS, **29**:4, pp.373-394, 2003.

*CUTE: Constrained and Unconstrained Testing Environment*,  
I. Bongartz, A.R. Conn, N.I.M. Gould and Ph.L. Toint,  
ACM TOMS, **21**:1, pp.123-160, 1995.

sifdecoder(1).