

**NAME**

CUTEST\_udimse – CUTEst tool to determine the number of nonzeros required to store the sparse Hessian matrix in finite element format.

**SYNOPSIS**

CALL CUTEST\_udimse( status, ne, he\_val\_ne, he\_row\_ne )

**DESCRIPTION**

The CUTEST\_udimse subroutine determine the number of nonzeros required to store the Hessian matrix of the objective function of the problem decoded from a SIF file by the script *sifdecoder* at the point X. This Hessian matrix is stored as a sparse matrix in finite element format

$$H = \sum_{e=1}^{ne} H_e,$$

where each square symmetric element  $H_i$  involves a small subset of the rows of the Hessian matrix.

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\_udimse are as follows

**status** [out] - integer

the output status: 0 for a succesful call, 1 for an array allocation/deallocation error, 2 for an array bound error, 3 for an evaluation error,

**ne** [out] - integer

the number of "finite-elements" used,

**he\_val\_ne** [out] - integer

the dimension of the array needed to store the real values of the Hessian, taking all the elements into account (i.e. the dimension of the array HE\_val).

**he\_row\_ne** [out] - integer

the dimension of the array needed to store the integer values of the Hessian (i.e. the dimension of the array HE\_row).

**AUTHORS**

I. Bongartz, A.R. Conn, N.I.M. Gould, D. Orban and Ph.L. Toint

**SEE ALSO**

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

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

Technical Report, Rutherford Appleton Laboratory, 2013.

*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.

cutest\_cdimse(3M), sifdecoder(1).

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**he\_row\_ne** [out] - integer

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