

**NAME**

CUTEST\_cshp – CUTEst tool to evaluate the sparsity pattern of the Hessian of the Lagrangian function.

**SYNOPSIS**

CALL CUTEST\_cshp( status, n, nnzh, lh, H\_row, H\_col )

**DESCRIPTION**

The CUTEST\_cshp subroutine evaluates the sparsity pattern of the Hessian of the Lagrangian function  $l(x, y) = f(x) + y^T c(x)$  for the problem, decoded from a SIF file by the script *sifdecoder*, in coordinate format.

The problem under consideration is to minimize or maximize an objective function  $f(x)$  over all  $x \in R^n$  subject to general equations  $c_i(x) = 0$ , ( $i \in 1, \dots, m_E$ ), general inequalities  $c_i^l \leq c_i(x) \leq c_i^u$  ( $i \in m_E + 1, \dots, m$ ), and simple bounds  $x^l \leq x \leq x^u$ . The objective function is group-partially separable and all constraint functions are partially separable.

**ARGUMENTS**

The arguments of CUTEST\_cshp 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,

**n** [in] - integer

the number of variables for the problem,

**nnzh** [out] - integer

the number of nonzeros in the Hessian matrix,

**lh** [in] - integer

the actual declared dimensions of H\_row and H\_col,

**H\_row** [out] - integer

an array which gives the row indices of the nonzeros of the Hessian matrix of the Lagrangian function; only the upper triangular part of the Hessian is stored, and

**H\_col** [out] - integer

an array which gives the column indices of the nonzeros of the Hessian matrix of the Lagrangian function corresponding to the row indices in H\_row.

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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.

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