NAME

CUTEST_chjprod − CUTEst tool to form the matrix-vector product of a vector with the Hessian matrix of the John function.

SYNOPSIS

CALL CUTEST_chjprod(status, n, m, goth, X, y0, Y, VECTOR, RESULT)

For real rather than double precision arguments, instead

CALL CUTEST_chjprod_s(...)

and for quadruple precision arguments, when available,

CALL CUTEST_chjprod_q(...)

DESCRIPTION

The CUTEST_chjprod subroutine forms the product of a vector with the Hessian matrix of the John function $j(x, y0, y) = y0\, f(x) + y^T c(x)$ corresponding to the problem decoded from a SIF file by the script *sifdecoder* at the point $(x, u0, y)$ = (X,y0,Y).

The problem under consideration is to minimize or maximize an objective function $f(x)$ over all $x \in R^n$ subject to general equations $c_i(x) = 0$, $(i \in 1, \ldots, m_E)$, general inequalities $c_i^l \leq c_i(x) \leq c_i^{u,}$ $(i \in m_E + 1, \ldots, m)$, 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_chjprod are as follows

status [out] - integer
the outputr status: 0 for a succesful 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,

m [in] - integer
the total number of general constraints,

goth [in] - logical
a logical variable which specifies whether the first and second derivatives of the groups and elements have already been set and y0 (below) has not changed (goth = .TRUE.) or if they should be computed (goth = .FALSE.),

X [in] - real/double precision
when goth = .FALSE., the derivatives will be evaluated at X. Otherwise X is not used.

y0 [in] - real/double precision
the John scalar associated with the objective,

Y [in] - real/double precision
when goth = .FALSE., the derivatives will be evaluated with Lagrange multipliers Y. Otherwise Y is not used,

VECTOR [in] - real/double precision
an array which gives the vector whose product with the Hessian is required,

RESULT [out] - real/double precision
an array which gives the result of multiplying the Hessian by VECTOR.

NOTE

goth should be set to .TRUE. whenever

(1)
a call has been made to CUTEST_cdhj or CUTEST_cshj at the current point, or

(2)
a previous call to CUTEST_chjprod, with goth = .FALSE., at the current point has been made.

Otherwise, it should be set .FALSE.

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,
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_uhprod(3M), cutest_chprod(3M), sifdecoder(1).