NAME

CEH – CUTEr tool to evaluate the sparse Lagrangian Hessian matrix in finite element format.

By convention, the signs of the Lagrange multipliers V are set so the Lagrangian function can be written as $L(X, V) = f(X) + < c(X), V >$.

SYNOPSIS

CALL CEH(N, M, X, LV, V, NE, IRNHI, LIRNHI, LE, IPRNHI, HI, LHI, IPRHI, BYROWS)

DESCRIPTION

The CEH subroutine evaluates the Hessian matrix of the Lagrangian function for the problem decoded into OUTSDIF.d at the point X in the constrained minimization case. This Hessian matrix is stored as a sparse matrix in finite element format

H = sum H_i (i=1,...,NE),

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

ARGUMENTS

The arguments of CEH are as follows

N [in] - integer
the number of variables for the problem,

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

X [in] - real/double precision
an array which gives the current estimate of the solution of the problem,

LV [in] - integer
the actual declared dimension of V,

V [in] - real/double precision
an array which gives the Lagrange multipliers,

NE [out] - integer
the number, ne, of "finite-elements" used,

IRNHI [out] - integer
an array which holds a list of the row indices involved which each element. Those for element i directly preceed those for element i+1, i = 1, ..., NE-1. Since the elements are symmetric, IRNHI is also the list of column indices involved with each element.

LIRNHI [in] - integer
the actual declared dimension of IRNHI,

LE [in] - integer
the actual declared dimensions of IPRNHI and IPRHI,

IPRNHI [out] - integer
IPRNHI(i) points to the position in IRNHI of the first row index involved with element number i: the row indices of element number i are stored in IRNHI between the indices IPRNHI(i) and IPRNHI(i+1)-1. IPRNHI(NE+1) points to the first empty location in IRNHI,

HI [out] - real/double precision
an array of the nonzeros in the upper triangle of H_i, evaluated at X and stored by rows, or by columns. Those for element i directly proceed those for element, i+1, i = 1, ..., NE-1. Element number i contains the values stored between

HI(IPRHI(i)) and HI(IPRHI(i+1)-1)

and involves the rows/columns stored between

IRNHI(IPRNHI(i)) and IRNHI(IPRNHI(i+1)-1).

LHI [in] - integer
the actual declared dimension of HI,

IPRHI [out] - integer
IPRHI(i) points to the position in HI of the first nonzero involved with element number i: the values involved in element number i are stored in HI between the indices IPRHI(i) and IPRHI(i+1)-1. IPRHI(NE+1) points to the first empty location in HI,

BYROWS [in] - logical
must be set to .TRUE. if the upper triangle of each H_i is to be stored by rows, and to .FALSE. if it is to be stored by columns.

AUTHORS

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

SEE ALSO

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, TOMS, **21**:1, pp.123-160, 1995.

ueh(3M).