## NAME

cgdma – CUTEr CG_DESCENT test driver

## SYNOPSIS

cgdma

## DESCRIPTION

The *cgdma* main program test drives CG_DESCENT on SIF problems from the CUTEr distribution.

The CG_DESCENT package is a nonlinear congugate-gradient method for large-scale unconstrained minimization designed by William Hager and Hongchao Zhang (U. Florida).

## USAGE

The CG_DESCENT file cg_desecent.f should be compiled, and the resulting file cg_descent.o placed in (or symbolically linked to) the directory $MYCUTER/double/bin.

There is no single-precision version.

## NOTE

If no CG_DESCENT.SPC file is present in the current directory, the default version is copied from $CUTER/common/src/pkg/cg_descent/. Default specifications are as follows:

```
 1.0D-5    eps         The stopping tolerance
 1.0D-1    delta       Wolfe line search parameter
 9.0D-1    sigma        Wolfe line search parameter
 1.0D-6    epsilon     approximate Wolfe threshold factor
 5.0D-1    theta       update
 6.6D-1    gamma        required decay factor in interval
 5.0D+0    rho         growth factor in bracket
 1.0D-2    eta         lower bound for cg's beta_k
 1.0D-2    psi0        factor used in very initial starting guess
 1.0D-1    psi1        factor previous step multiplied by in QuadStep
 2.0D+0    psi2         factor previous step is multipled by for startup
1.0D-12    QuadCutOff   lower bound on rel change in f before QuadStep
 1.0D+0    restart_fac  restart cg in restart_fac*n iterations
 5.0D+2    maxit_fac    terminate in maxit_fac*n iterations
 0.0D+0    feps         stop when value change <= feps*|f|
   50     nexpand      number of grow/shrink allowed in bracket
   50     nsecant      number of secant steps allowed in line search
    T     QuadStep     use initial quad interpolation in line search
    F     PrintLevel   F (no print) T (intermediate results)
    F     PrintFinal   F (no print) T (print error messages, final error)
    F     StopRule     F (|grad|_infty <= tol) T (... <= tol*(1+|f|))
    F     ERule        F (eps_k = eps|f|) T (eps_k = eps)
    T     AWolfe       F (Wolfe) T (+approx Wolfe) 2 (epsilon pert)
    F     Step         F (no initial line search guess) T (guess in gnorm)
```

The reader is referred to the paper quoted below and the code itself if he or she wishes to modify these parameters.

## ENVIRONMENT

**CUTER**

Parent directory for CUTEr

**MYCUTER**

Home directory of the installed CUTEr distribution.

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

*CG_DESCENT, A conjugate gradient method with guaranteed descent*, W. W. Hager and H. Zhang, Department of Mathematics, University of Florida, Gainesville, FL 32611, USA, January, 2004.

sdcgd(1), cgd(1).