C2. Alphabetical Listing of Explicit Interfaces

The file supplied as `nr.f90` contains explicit interfaces for all the Numerical Recipes routines (except those already in the module `nrutil`). The interfaces are in alphabetical order, by the generic interface name, if one exists, or by the specific routine name if there is no generic name.

The file `nr.f90` is normally invoked via a `USE` statement within a main program or subroutine that references a Numerical Recipes routine. See §21.1 for an example.

```
MODULE nr
INTERFACE
    SUBROUTINE airy(x,ai,bi,aip,bip)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: ai,bi,aip,bip
    END SUBROUTINE airy
END INTERFACE
INTERFACE
    SUBROUTINE amebsa(p,y,pb,yb,ftol,func,iter,temptr)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: iter
    REAL(SP), INTENT(INOUT) :: yb
    REAL(SP), INTENT(IN) :: ftol,temptr
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y,pb
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: p
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE amebsa
END INTERFACE
INTERFACE
    SUBROUTINE amoeba(p,y,ftol,func,iter)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: iter
    REAL(SP), INTENT(IN) :: ftol
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: p
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
```

```
    END SUBROUTINE amoeba
END INTERFACE
INTERFACE
    SUBROUTINE anneal(x,y,iorder)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(INOUT) :: iorder
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    END SUBROUTINE anneal
END INTERFACE
INTERFACE
    SUBROUTINE asolve(b,x,itrnsp)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(IN) :: b
    REAL(DP), DIMENSION(:), INTENT(OUT) :: x
    INTEGER(I4B), INTENT(IN) :: itrnsp
    END SUBROUTINE asolve
END INTERFACE
INTERFACE
    SUBROUTINE atimes(x,r,itrnsp)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(IN) :: x
    REAL(DP), DIMENSION(:), INTENT(OUT) :: r
    INTEGER(I4B), INTENT(IN) :: itrnsp
    END SUBROUTINE atimes
END INTERFACE
INTERFACE
    SUBROUTINE avevar(data,ave,var)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data
    REAL(SP), INTENT(OUT) :: ave,var
    END SUBROUTINE avevar
END INTERFACE
INTERFACE
    SUBROUTINE balanc(a)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    END SUBROUTINE balanc
END INTERFACE
INTERFACE
    SUBROUTINE banbks(a,m1,m2,al,indx,b)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: m1,m2
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indx
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: a,al
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: b
    END SUBROUTINE banbks
END INTERFACE
INTERFACE
    SUBROUTINE bandec(a,m1,m2,al,indx,d)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: m1,m2
    INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: indx
    REAL(SP), INTENT(OUT) :: d
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: al
    END SUBROUTINE bandec
END INTERFACE
INTERFACE
    SUBROUTINE banmul(a,m1,m2,x,b)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: m1,m2
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(OUT) :: b
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: a
```

```
    END SUBROUTINE banmul
END INTERFACE
INTERFACE
    SUBROUTINE bcucof(y,y1,y2,y12,d1,d2,c)
    USE nrtype
    REAL(SP), INTENT(IN) :: d1,d2
    REAL(SP), DIMENSION(4), INTENT(IN) :: y,y1,y2,y12
    REAL(SP), DIMENSION(4,4), INTENT(OUT) :: c
    END SUBROUTINE bcucof
END INTERFACE
INTERFACE
    SUBROUTINE bcuint(y,y1,y2,y12,x1l,x1u,x2l,x2u,x1,x2,ansy,&
        ansy1,ansy2)
    USE nrtype
    REAL(SP), DIMENSION(4), INTENT(IN) :: y,y1,y2,y12
    REAL(SP), INTENT(IN) :: x1l,x1u,x2l,x2u,x1,x2
    REAL(SP), INTENT(OUT) :: ansy,ansy1,ansy2
    END SUBROUTINE bcuint
END INTERFACE
INTERFACE beschb
    SUBROUTINE beschb_s(x,gam1,gam2,gampl,gammi)
    USE nrtype
    REAL(DP), INTENT(IN) :: x
    REAL(DP), INTENT(OUT) :: gam1,gam2,gampl,gammi
    END SUBROUTINE beschb_s

    SUBROUTINE beschb_v(x,gam1,gam2,gampl,gammi)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(IN) :: x
    REAL(DP), DIMENSION(:), INTENT(OUT) :: gam1,gam2,gampl,gammi
    END SUBROUTINE beschb_v
END INTERFACE
INTERFACE bessi
    FUNCTION bessi_s(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessi_s
    END FUNCTION bessi_s

    FUNCTION bessi_v(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessi_v
    END FUNCTION bessi_v
END INTERFACE
INTERFACE bessi0
    FUNCTION bessi0_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessi0_s
    END FUNCTION bessi0_s

    FUNCTION bessi0_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessi0_v
    END FUNCTION bessi0_v
END INTERFACE
INTERFACE bessi1
    FUNCTION bessi1_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessi1_s
    END FUNCTION bessi1_s
```

```
    FUNCTION bessi1_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessi1_v
    END FUNCTION bessi1_v
END INTERFACE
INTERFACE
    SUBROUTINE bessik(x,xnu,ri,rk,rip,rkp)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,xnu
    REAL(SP), INTENT(OUT) :: ri,rk,rip,rkp
    END SUBROUTINE bessik
END INTERFACE
INTERFACE bessj
    FUNCTION bessj_s(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessj_s
    END FUNCTION bessj_s

    FUNCTION bessj_v(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessj_v
    END FUNCTION bessj_v
END INTERFACE
INTERFACE bessj0
    FUNCTION bessj0_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessj0_s
    END FUNCTION bessj0_s

    FUNCTION bessj0_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessj0_v
    END FUNCTION bessj0_v
END INTERFACE
INTERFACE bessj1
    FUNCTION bessj1_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessj1_s
    END FUNCTION bessj1_s

    FUNCTION bessj1_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessj1_v
    END FUNCTION bessj1_v
END INTERFACE
INTERFACE bessjy
    SUBROUTINE bessjy_s(x,xnu,rj,ry,rjp,ryp)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,xnu
    REAL(SP), INTENT(OUT) :: rj,ry,rjp,ryp
    END SUBROUTINE bessjy_s

    SUBROUTINE bessjy_v(x,xnu,rj,ry,rjp,ryp)
    USE nrtype
    REAL(SP), INTENT(IN) :: xnu
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(OUT) :: rj,rjp,ry,ryp
```

```
    END SUBROUTINE bessjy_v
  END INTERFACE
  INTERFACE bessk
    FUNCTION bessk_s(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessk_s
    END FUNCTION bessk_s

    FUNCTION bessk_v(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessk_v
    END FUNCTION bessk_v
  END INTERFACE
  INTERFACE bessk0
    FUNCTION bessk0_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessk0_s
    END FUNCTION bessk0_s

    FUNCTION bessk0_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessk0_v
    END FUNCTION bessk0_v
  END INTERFACE
  INTERFACE bessk1
    FUNCTION bessk1_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessk1_s
    END FUNCTION bessk1_s

    FUNCTION bessk1_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessk1_v
    END FUNCTION bessk1_v
  END INTERFACE
  INTERFACE bessy
    FUNCTION bessy_s(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessy_s
    END FUNCTION bessy_s

    FUNCTION bessy_v(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessy_v
    END FUNCTION bessy_v
  END INTERFACE
  INTERFACE bessy0
    FUNCTION bessy0_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessy0_s
    END FUNCTION bessy0_s

    FUNCTION bessy0_v(x)
    USE nrtype
```

```
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessy0_v
    END FUNCTION bessy0_v
END INTERFACE
INTERFACE bessy1
    FUNCTION bessy1_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: bessy1_s
    END FUNCTION bessy1_s

    FUNCTION bessy1_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: bessy1_v
    END FUNCTION bessy1_v
END INTERFACE
INTERFACE beta
    FUNCTION beta_s(z,w)
    USE nrtype
    REAL(SP), INTENT(IN) :: z,w
    REAL(SP) :: beta_s
    END FUNCTION beta_s

    FUNCTION beta_v(z,w)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: z,w
    REAL(SP), DIMENSION(size(z)) :: beta_v
    END FUNCTION beta_v
END INTERFACE
INTERFACE betacf
    FUNCTION betacf_s(a,b,x)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b,x
    REAL(SP) :: betacf_s
    END FUNCTION betacf_s

    FUNCTION betacf_v(a,b,x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,b,x
    REAL(SP), DIMENSION(size(x)) :: betacf_v
    END FUNCTION betacf_v
END INTERFACE
INTERFACE betai
    FUNCTION betai_s(a,b,x)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b,x
    REAL(SP) :: betai_s
    END FUNCTION betai_s

    FUNCTION betai_v(a,b,x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,b,x
    REAL(SP), DIMENSION(size(a)) :: betai_v
    END FUNCTION betai_v
END INTERFACE
INTERFACE bico
    FUNCTION bico_s(n,k)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n,k
    REAL(SP) :: bico_s
    END FUNCTION bico_s

    FUNCTION bico_v(n,k)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: n,k
    REAL(SP), DIMENSION(size(n)) :: bico_v
```

```
    END FUNCTION bico_v
END INTERFACE
INTERFACE
    FUNCTION bnldev(pp,n)
    USE nrtype
    REAL(SP), INTENT(IN) :: pp
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP) :: bnldev
    END FUNCTION bnldev
END INTERFACE
INTERFACE
    FUNCTION brent(ax,bx,cx,func,tol,xmin)
    USE nrtype
    REAL(SP), INTENT(IN) :: ax,bx,cx,tol
    REAL(SP), INTENT(OUT) :: xmin
    REAL(SP) :: brent
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION brent
END INTERFACE
INTERFACE
    SUBROUTINE broydn(x,check)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
    LOGICAL(LGT), INTENT(OUT) :: check
    END SUBROUTINE broydn
END INTERFACE
INTERFACE
    SUBROUTINE bsstep(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:), INTENT(IN) :: dydx,yscal
    REAL(SP), INTENT(INOUT) :: x
    REAL(SP), INTENT(IN) :: htry,eps
    REAL(SP), INTENT(OUT) :: hdid,hnext
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE bsstep
END INTERFACE
INTERFACE
    SUBROUTINE caldat(julian,mm,id,iyyy)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: julian
    INTEGER(I4B), INTENT(OUT) :: mm,id,iyyy
    END SUBROUTINE caldat
END INTERFACE
INTERFACE
    FUNCTION chder(a,b,c)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(:), INTENT(IN) :: c
    REAL(SP), DIMENSION(size(c)) :: chder
    END FUNCTION chder
```

```
END INTERFACE
INTERFACE chebev
    FUNCTION chebev_s(a,b,c,x)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b,x
    REAL(SP), DIMENSION(:), INTENT(IN) :: c
    REAL(SP) :: chebev_s
    END FUNCTION chebev_s

    FUNCTION chebev_v(a,b,c,x)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(:), INTENT(IN) :: c,x
    REAL(SP), DIMENSION(size(x)) :: chebev_v
    END FUNCTION chebev_v
END INTERFACE
INTERFACE
    FUNCTION chebft(a,b,n,func)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(n) :: chebft
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION chebft
END INTERFACE
INTERFACE
    FUNCTION chebpc(c)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: c
    REAL(SP), DIMENSION(size(c)) :: chebpc
    END FUNCTION chebpc
END INTERFACE
INTERFACE
    FUNCTION chint(a,b,c)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(:), INTENT(IN) :: c
    REAL(SP), DIMENSION(size(c)) :: chint
    END FUNCTION chint
END INTERFACE
INTERFACE
    SUBROUTINE choldc(a,p)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:), INTENT(OUT) :: p
    END SUBROUTINE choldc
END INTERFACE
INTERFACE
    SUBROUTINE cholsl(a,p,b,x)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: a
    REAL(SP), DIMENSION(:), INTENT(IN) :: p,b
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
    END SUBROUTINE cholsl
END INTERFACE
INTERFACE
    SUBROUTINE chsone(bins,ebins,knstrn,df,chsq,prob)
    USE nrtype
```

```
    INTEGER(I4B), INTENT(IN) :: knstrn
    REAL(SP), INTENT(OUT) :: df,chsq,prob
    REAL(SP), DIMENSION(:), INTENT(IN) :: bins,ebins
    END SUBROUTINE chsone
END INTERFACE
INTERFACE
    SUBROUTINE chstwo(bins1,bins2,knstrn,df,chsq,prob)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: knstrn
    REAL(SP), INTENT(OUT) :: df,chsq,prob
    REAL(SP), DIMENSION(:), INTENT(IN) :: bins1,bins2
    END SUBROUTINE chstwo
END INTERFACE
INTERFACE
    SUBROUTINE cisi(x,ci,si)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: ci,si
    END SUBROUTINE cisi
END INTERFACE
INTERFACE
    SUBROUTINE cntab1(nn,chisq,df,prob,cramrv,ccc)
    USE nrtype
    INTEGER(I4B), DIMENSION(:,:), INTENT(IN) :: nn
    REAL(SP), INTENT(OUT) :: chisq,df,prob,cramrv,ccc
    END SUBROUTINE cntab1
END INTERFACE
INTERFACE
    SUBROUTINE cntab2(nn,h,hx,hy,hygx,hxgy,uygx,uxgy,uxy)
    USE nrtype
    INTEGER(I4B), DIMENSION(:,:), INTENT(IN) :: nn
    REAL(SP), INTENT(OUT) :: h,hx,hy,hygx,hxgy,uygx,uxgy,uxy
    END SUBROUTINE cntab2
END INTERFACE
INTERFACE
    FUNCTION convlv(data,respns,isign)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data
    REAL(SP), DIMENSION(:), INTENT(IN) :: respns
    INTEGER(I4B), INTENT(IN) :: isign
    REAL(SP), DIMENSION(size(data)) :: convlv
    END FUNCTION convlv
END INTERFACE
INTERFACE
    FUNCTION correl(data1,data2)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    REAL(SP), DIMENSION(size(data1)) :: correl
    END FUNCTION correl
END INTERFACE
INTERFACE
    SUBROUTINE cosft1(y)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    END SUBROUTINE cosft1
END INTERFACE
INTERFACE
    SUBROUTINE cosft2(y,isign)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE cosft2
END INTERFACE
INTERFACE
```

```
    SUBROUTINE covsrt(covar,maska)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: covar
    LOGICAL(LGT), DIMENSION(:), INTENT(IN) :: maska
    END SUBROUTINE covsrt
END INTERFACE
INTERFACE
    SUBROUTINE cyclic(a,b,c,alpha,beta,r,x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN):: a,b,c,r
    REAL(SP), INTENT(IN) :: alpha,beta
    REAL(SP), DIMENSION(:), INTENT(OUT):: x
    END SUBROUTINE cyclic
END INTERFACE
INTERFACE
    SUBROUTINE daub4(a,isign)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE daub4
END INTERFACE
INTERFACE dawson
    FUNCTION dawson_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: dawson_s
    END FUNCTION dawson_s

    FUNCTION dawson_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: dawson_v
    END FUNCTION dawson_v
END INTERFACE
INTERFACE
    FUNCTION dbrent(ax,bx,cx,func,dbrent_dfunc,tol,xmin)
    USE nrtype
    REAL(SP), INTENT(IN) :: ax,bx,cx,tol
    REAL(SP), INTENT(OUT) :: xmin
    REAL(SP) :: dbrent
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func

        FUNCTION dbrent_dfunc(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: dbrent_dfunc
        END FUNCTION dbrent_dfunc
    END INTERFACE
    END FUNCTION dbrent
END INTERFACE
INTERFACE
    SUBROUTINE ddpoly(c,x,pd)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(IN) :: c
    REAL(SP), DIMENSION(:), INTENT(OUT) :: pd
    END SUBROUTINE ddpoly
END INTERFACE
INTERFACE
    FUNCTION decchk(string,ch)
```

```
        USE nrtype
        CHARACTER(1), DIMENSION(:), INTENT(IN) :: string
        CHARACTER(1), INTENT(OUT) :: ch
        LOGICAL(LGT) :: decchk
        END FUNCTION decchk
    END INTERFACE
    INTERFACE
        SUBROUTINE dfpmin(p,gtol,iter,fret,func,dfunc)
        USE nrtype
        INTEGER(I4B), INTENT(OUT) :: iter
        REAL(SP), INTENT(IN) :: gtol
        REAL(SP), INTENT(OUT) :: fret
        REAL(SP), DIMENSION(:), INTENT(INOUT) :: p
        INTERFACE
            FUNCTION func(p)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: p
            REAL(SP) :: func
            END FUNCTION func

            FUNCTION dfunc(p)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: p
            REAL(SP), DIMENSION(size(p)) :: dfunc
            END FUNCTION dfunc
        END INTERFACE
        END SUBROUTINE dfpmin
    END INTERFACE
    INTERFACE
        FUNCTION dfridr(func,x,h,err)
        USE nrtype
        REAL(SP), INTENT(IN) :: x,h
        REAL(SP), INTENT(OUT) :: err
        REAL(SP) :: dfridr
        INTERFACE
            FUNCTION func(x)
            USE nrtype
            REAL(SP), INTENT(IN) :: x
            REAL(SP) :: func
            END FUNCTION func
        END INTERFACE
        END FUNCTION dfridr
    END INTERFACE
    INTERFACE
        SUBROUTINE dftcor(w,delta,a,b,endpts,corre,corim,corfac)
        USE nrtype
        REAL(SP), INTENT(IN) :: w,delta,a,b
        REAL(SP), INTENT(OUT) :: corre,corim,corfac
        REAL(SP), DIMENSION(:), INTENT(IN) :: endpts
        END SUBROUTINE dftcor
    END INTERFACE
    INTERFACE
        SUBROUTINE dftint(func,a,b,w,cosint,sinint)
        USE nrtype
        REAL(SP), INTENT(IN) :: a,b,w
        REAL(SP), INTENT(OUT) :: cosint,sinint
        INTERFACE
            FUNCTION func(x)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: x
            REAL(SP), DIMENSION(size(x)) :: func
            END FUNCTION func
        END INTERFACE
        END SUBROUTINE dftint
```

```
END INTERFACE
INTERFACE
    SUBROUTINE difeq(k,k1,k2,jsf,is1,isf,indexv,s,y)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: is1,isf,jsf,k,k1,k2
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indexv
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: s
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: y
    END SUBROUTINE difeq
END INTERFACE
INTERFACE
    FUNCTION eclass(lista,listb,n)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: lista,listb
    INTEGER(I4B), INTENT(IN) :: n
    INTEGER(I4B), DIMENSION(n) :: eclass
    END FUNCTION eclass
END INTERFACE
INTERFACE
    FUNCTION eclazz(equiv,n)
    USE nrtype
    INTERFACE
        FUNCTION equiv(i,j)
        USE nrtype
        LOGICAL(LGT) :: equiv
        INTEGER(I4B), INTENT(IN) :: i,j
        END FUNCTION equiv
    END INTERFACE
    INTEGER(I4B), INTENT(IN) :: n
    INTEGER(I4B), DIMENSION(n) :: eclazz
    END FUNCTION eclazz
END INTERFACE
INTERFACE
    FUNCTION ei(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: ei
    END FUNCTION ei
END INTERFACE
INTERFACE
    SUBROUTINE eigsrt(d,v)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: d
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: v
    END SUBROUTINE eigsrt
END INTERFACE
INTERFACE elle
    FUNCTION elle_s(phi,ak)
    USE nrtype
    REAL(SP), INTENT(IN) :: phi,ak
    REAL(SP) :: elle_s
    END FUNCTION elle_s

    FUNCTION elle_v(phi,ak)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: phi,ak
    REAL(SP), DIMENSION(size(phi)) :: elle_v
    END FUNCTION elle_v
END INTERFACE
INTERFACE ellf
    FUNCTION ellf_s(phi,ak)
    USE nrtype
    REAL(SP), INTENT(IN) :: phi,ak
    REAL(SP) :: ellf_s
```

```
    END FUNCTION ellf_s

    FUNCTION ellf_v(phi,ak)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: phi,ak
    REAL(SP), DIMENSION(size(phi)) :: ellf_v
    END FUNCTION ellf_v
END INTERFACE
INTERFACE ellpi
    FUNCTION ellpi_s(phi,en,ak)
    USE nrtype
    REAL(SP), INTENT(IN) :: phi,en,ak
    REAL(SP) :: ellpi_s
    END FUNCTION ellpi_s

    FUNCTION ellpi_v(phi,en,ak)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: phi,en,ak
    REAL(SP), DIMENSION(size(phi)) :: ellpi_v
    END FUNCTION ellpi_v
END INTERFACE
INTERFACE
    SUBROUTINE elmhes(a)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    END SUBROUTINE elmhes
END INTERFACE
INTERFACE erf
    FUNCTION erf_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: erf_s
    END FUNCTION erf_s

    FUNCTION erf_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: erf_v
    END FUNCTION erf_v
END INTERFACE
INTERFACE erfc
    FUNCTION erfc_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: erfc_s
    END FUNCTION erfc_s

    FUNCTION erfc_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: erfc_v
    END FUNCTION erfc_v
END INTERFACE
INTERFACE erfcc
    FUNCTION erfcc_s(x)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: erfcc_s
    END FUNCTION erfcc_s

    FUNCTION erfcc_v(x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: erfcc_v
    END FUNCTION erfcc_v
END INTERFACE
INTERFACE
```

```
    SUBROUTINE eulsum(sum,term,jterm)
    USE nrtype
    REAL(SP), INTENT(INOUT) :: sum
    REAL(SP), INTENT(IN) :: term
    INTEGER(I4B), INTENT(IN) :: jterm
    END SUBROUTINE eulsum
END INTERFACE
INTERFACE
    FUNCTION evlmem(fdt,d,xms)
    USE nrtype
    REAL(SP), INTENT(IN) :: fdt,xms
    REAL(SP), DIMENSION(:), INTENT(IN) :: d
    REAL(SP) :: evlmem
    END FUNCTION evlmem
END INTERFACE
INTERFACE expdev
    SUBROUTINE expdev_s(harvest)
    USE nrtype
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE expdev_s

    SUBROUTINE expdev_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: harvest
    END SUBROUTINE expdev_v
END INTERFACE
INTERFACE
    FUNCTION expint(n,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: expint
    END FUNCTION expint
END INTERFACE
INTERFACE factln
    FUNCTION factln_s(n)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP) :: factln_s
    END FUNCTION factln_s

    FUNCTION factln_v(n)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: n
    REAL(SP), DIMENSION(size(n)) :: factln_v
    END FUNCTION factln_v
END INTERFACE
INTERFACE factrl
    FUNCTION factrl_s(n)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP) :: factrl_s
    END FUNCTION factrl_s

    FUNCTION factrl_v(n)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: n
    REAL(SP), DIMENSION(size(n)) :: factrl_v
    END FUNCTION factrl_v
END INTERFACE
INTERFACE
    SUBROUTINE fasper(x,y,ofac,hifac,px,py,jmax,prob)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), INTENT(IN) :: ofac,hifac
    INTEGER(I4B), INTENT(OUT) :: jmax
```

```
    REAL(SP), INTENT(OUT) :: prob
    REAL(SP), DIMENSION(:), POINTER :: px,py
    END SUBROUTINE fasper
END INTERFACE
INTERFACE
    SUBROUTINE fdjac(x,fvec,df)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: fvec
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: df
    END SUBROUTINE fdjac
END INTERFACE
INTERFACE
    SUBROUTINE fgauss(x,a,y,dyda)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,a
    REAL(SP), DIMENSION(:), INTENT(OUT) :: y
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: dyda
    END SUBROUTINE fgauss
END INTERFACE
INTERFACE
    SUBROUTINE fit(x,y,a,b,siga,sigb,chi2,q,sig)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), INTENT(OUT) :: a,b,siga,sigb,chi2,q
    REAL(SP), DIMENSION(:), OPTIONAL, INTENT(IN) :: sig
    END SUBROUTINE fit
END INTERFACE
INTERFACE
    SUBROUTINE fitexy(x,y,sigx,sigy,a,b,siga,sigb,chi2,q)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,sigx,sigy
    REAL(SP), INTENT(OUT) :: a,b,siga,sigb,chi2,q
    END SUBROUTINE fitexy
END INTERFACE
INTERFACE
    SUBROUTINE fixrts(d)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: d
    END SUBROUTINE fixrts
END INTERFACE
INTERFACE
    FUNCTION fleg(x,n)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(n) :: fleg
    END FUNCTION fleg
END INTERFACE
INTERFACE
    SUBROUTINE flmoon(n,nph,jd,frac)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n,nph
    INTEGER(I4B), INTENT(OUT) :: jd
    REAL(SP), INTENT(OUT) :: frac
    END SUBROUTINE flmoon
END INTERFACE
INTERFACE four1
    SUBROUTINE four1_dp(data,isign)
    USE nrtype
    COMPLEX(DPC), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four1_dp
```

```
    SUBROUTINE four1_sp(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four1_sp
END INTERFACE
INTERFACE
    SUBROUTINE four1_alt(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four1_alt
END INTERFACE
INTERFACE
    SUBROUTINE four1_gather(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four1_gather
END INTERFACE
INTERFACE
    SUBROUTINE four2(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:), INTENT(INOUT) :: data
    INTEGER(I4B),INTENT(IN) :: isign
    END SUBROUTINE four2
END INTERFACE
INTERFACE
    SUBROUTINE four2_alt(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four2_alt
END INTERFACE
INTERFACE
    SUBROUTINE four3(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:,:), INTENT(INOUT) :: data
    INTEGER(I4B),INTENT(IN) :: isign
    END SUBROUTINE four3
END INTERFACE
INTERFACE
    SUBROUTINE four3_alt(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE four3_alt
END INTERFACE
INTERFACE
    SUBROUTINE fourcol(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE fourcol
END INTERFACE
INTERFACE
    SUBROUTINE fourcol_3d(data,isign)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:,:,:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE fourcol_3d
END INTERFACE
INTERFACE
    SUBROUTINE fourn_gather(data,nn,isign)
```

```
        USE nrtype
        COMPLEX(SPC), DIMENSION(:), INTENT(INOUT) :: data
        INTEGER(I4B), DIMENSION(:), INTENT(IN) :: nn
        INTEGER(I4B), INTENT(IN) :: isign
        END SUBROUTINE fourn_gather
    END INTERFACE
    INTERFACE fourrow
        SUBROUTINE fourrow_dp(data,isign)
        USE nrtype
        COMPLEX(DPC), DIMENSION(:,:), INTENT(INOUT) :: data
        INTEGER(I4B), INTENT(IN) :: isign
        END SUBROUTINE fourrow_dp

        SUBROUTINE fourrow_sp(data,isign)
        USE nrtype
        COMPLEX(SPC), DIMENSION(:,:), INTENT(INOUT) :: data
        INTEGER(I4B), INTENT(IN) :: isign
        END SUBROUTINE fourrow_sp
    END INTERFACE
    INTERFACE
        SUBROUTINE fourrow_3d(data,isign)
        USE nrtype
        COMPLEX(SPC), DIMENSION(:,:,:), INTENT(INOUT) :: data
        INTEGER(I4B), INTENT(IN) :: isign
        END SUBROUTINE fourrow_3d
    END INTERFACE
    INTERFACE
        FUNCTION fpoly(x,n)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        INTEGER(I4B), INTENT(IN) :: n
        REAL(SP), DIMENSION(n) :: fpoly
        END FUNCTION fpoly
    END INTERFACE
    INTERFACE
        SUBROUTINE fred2(a,b,t,f,w,g,ak)
        USE nrtype
        REAL(SP), INTENT(IN) :: a,b
        REAL(SP), DIMENSION(:), INTENT(OUT) :: t,f,w
        INTERFACE
            FUNCTION g(t)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: t
            REAL(SP), DIMENSION(size(t)) :: g
            END FUNCTION g

            FUNCTION ak(t,s)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: t,s
            REAL(SP), DIMENSION(size(t),size(s)) :: ak
            END FUNCTION ak
        END INTERFACE
        END SUBROUTINE fred2
    END INTERFACE
    INTERFACE
        FUNCTION fredin(x,a,b,t,f,w,g,ak)
        USE nrtype
        REAL(SP), INTENT(IN) :: a,b
        REAL(SP), DIMENSION(:), INTENT(IN) :: x,t,f,w
        REAL(SP), DIMENSION(size(x)) :: fredin
        INTERFACE
            FUNCTION g(t)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: t
            REAL(SP), DIMENSION(size(t)) :: g
```

```
        END FUNCTION g
        FUNCTION ak(t,s)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: t,s
        REAL(SP), DIMENSION(size(t),size(s)) :: ak
        END FUNCTION ak
    END INTERFACE
    END FUNCTION fredin
END INTERFACE
INTERFACE
    SUBROUTINE frenel(x,s,c)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: s,c
    END SUBROUTINE frenel
END INTERFACE
INTERFACE
    SUBROUTINE frprmn(p,ftol,iter,fret)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: iter
    REAL(SP), INTENT(IN) :: ftol
    REAL(SP), INTENT(OUT) :: fret
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: p
    END SUBROUTINE frprmn
END INTERFACE
INTERFACE
    SUBROUTINE ftest(data1,data2,f,prob)
    USE nrtype
    REAL(SP), INTENT(OUT) :: f,prob
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    END SUBROUTINE ftest
END INTERFACE
INTERFACE
    FUNCTION gamdev(ia)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: ia
    REAL(SP) :: gamdev
    END FUNCTION gamdev
END INTERFACE
INTERFACE gammln
    FUNCTION gammln_s(xx)
    USE nrtype
    REAL(SP), INTENT(IN) :: xx
    REAL(SP) :: gammln_s
    END FUNCTION gammln_s
    FUNCTION gammln_v(xx)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: xx
    REAL(SP), DIMENSION(size(xx)) :: gammln_v
    END FUNCTION gammln_v
END INTERFACE
INTERFACE gammp
    FUNCTION gammp_s(a,x)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,x
    REAL(SP) :: gammp_s
    END FUNCTION gammp_s
    FUNCTION gammp_v(a,x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,x
    REAL(SP), DIMENSION(size(a)) :: gammp_v
    END FUNCTION gammp_v
END INTERFACE
```

```
INTERFACE gammq
    FUNCTION gammq_s(a,x)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,x
    REAL(SP) :: gammq_s
    END FUNCTION gammq_s

    FUNCTION gammq_v(a,x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,x
    REAL(SP), DIMENSION(size(a)) :: gammq_v
    END FUNCTION gammq_v
END INTERFACE
INTERFACE gasdev
    SUBROUTINE gasdev_s(harvest)
    USE nrtype
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE gasdev_s

    SUBROUTINE gasdev_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: harvest
    END SUBROUTINE gasdev_v
END INTERFACE
INTERFACE
    SUBROUTINE gaucof(a,b,amu0,x,w)
    USE nrtype
    REAL(SP), INTENT(IN) :: amu0
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: a,b
    REAL(SP), DIMENSION(:), INTENT(OUT) :: x,w
    END SUBROUTINE gaucof
END INTERFACE
INTERFACE
    SUBROUTINE gauher(x,w)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: x,w
    END SUBROUTINE gauher
END INTERFACE
INTERFACE
    SUBROUTINE gaujac(x,w,alf,bet)
    USE nrtype
    REAL(SP), INTENT(IN) :: alf,bet
    REAL(SP), DIMENSION(:), INTENT(OUT) :: x,w
    END SUBROUTINE gaujac
END INTERFACE
INTERFACE
    SUBROUTINE gaulag(x,w,alf)
    USE nrtype
    REAL(SP), INTENT(IN) :: alf
    REAL(SP), DIMENSION(:), INTENT(OUT) :: x,w
    END SUBROUTINE gaulag
END INTERFACE
INTERFACE
    SUBROUTINE gauleg(x1,x2,x,w)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2
    REAL(SP), DIMENSION(:), INTENT(OUT) :: x,w
    END SUBROUTINE gauleg
END INTERFACE
INTERFACE
    SUBROUTINE gaussj(a,b)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a,b
    END SUBROUTINE gaussj
END INTERFACE
```

```
INTERFACE gcf
    FUNCTION gcf_s(a,x,gln)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,x
    REAL(SP), OPTIONAL, INTENT(OUT) :: gln
    REAL(SP) :: gcf_s
    END FUNCTION gcf_s
    FUNCTION gcf_v(a,x,gln)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,x
    REAL(SP), DIMENSION(:), OPTIONAL, INTENT(OUT) :: gln
    REAL(SP), DIMENSION(size(a)) :: gcf_v
    END FUNCTION gcf_v
END INTERFACE
INTERFACE
    FUNCTION golden(ax,bx,cx,func,tol,xmin)
    USE nrtype
    REAL(SP), INTENT(IN) :: ax,bx,cx,tol
    REAL(SP), INTENT(OUT) :: xmin
    REAL(SP) :: golden
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION golden
END INTERFACE
INTERFACE gser
    FUNCTION gser_s(a,x,gln)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,x
    REAL(SP), OPTIONAL, INTENT(OUT) :: gln
    REAL(SP) :: gser_s
    END FUNCTION gser_s
    FUNCTION gser_v(a,x,gln)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,x
    REAL(SP), DIMENSION(:), OPTIONAL, INTENT(OUT) :: gln
    REAL(SP), DIMENSION(size(a)) :: gser_v
    END FUNCTION gser_v
END INTERFACE
INTERFACE
    SUBROUTINE hqr(a,wr,wi)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: wr,wi
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    END SUBROUTINE hqr
END INTERFACE
INTERFACE
    SUBROUTINE hunt(xx,x,jlo)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: jlo
    REAL(SP), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(IN) :: xx
    END SUBROUTINE hunt
END INTERFACE
INTERFACE
    SUBROUTINE hypdrv(s,ry,rdyds)
    USE nrtype
    REAL(SP), INTENT(IN) :: s
    REAL(SP), DIMENSION(:), INTENT(IN) :: ry
```

```
    REAL(SP), DIMENSION(:), INTENT(OUT) :: rdyds
    END SUBROUTINE hypdrv
END INTERFACE
INTERFACE
    FUNCTION hypgeo(a,b,c,z)
    USE nrtype
    COMPLEX(SPC), INTENT(IN) :: a,b,c,z
    COMPLEX(SPC) :: hypgeo
    END FUNCTION hypgeo
END INTERFACE
INTERFACE
    SUBROUTINE hypser(a,b,c,z,series,deriv)
    USE nrtype
    COMPLEX(SPC), INTENT(IN) :: a,b,c,z
    COMPLEX(SPC), INTENT(OUT) :: series,deriv
    END SUBROUTINE hypser
END INTERFACE
INTERFACE
    FUNCTION icrc(crc,buf,jinit,jrev)
    USE nrtype
    CHARACTER(1), DIMENSION(:), INTENT(IN) :: buf
    INTEGER(I2B), INTENT(IN) :: crc,jinit
    INTEGER(I4B), INTENT(IN) :: jrev
    INTEGER(I2B) :: icrc
    END FUNCTION icrc
END INTERFACE
INTERFACE
    FUNCTION igray(n,is)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n,is
    INTEGER(I4B) :: igray
    END FUNCTION igray
END INTERFACE
INTERFACE
    RECURSIVE SUBROUTINE index_bypack(arr,index,partial)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: arr
    INTEGER(I4B), DIMENSION(:), INTENT(INOUT) :: index
    INTEGER, OPTIONAL, INTENT(IN) :: partial
    END SUBROUTINE index_bypack
END INTERFACE
INTERFACE indexx
    SUBROUTINE indexx_sp(arr,index)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: arr
    INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: index
    END SUBROUTINE indexx_sp
    SUBROUTINE indexx_i4b(iarr,index)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: iarr
    INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: index
    END SUBROUTINE indexx_i4b
END INTERFACE
INTERFACE
    FUNCTION interp(uc)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: uc
    REAL(DP), DIMENSION(2*size(uc,1)-1,2*size(uc,1)-1) :: interp
    END FUNCTION interp
END INTERFACE
INTERFACE
    FUNCTION rank(indx)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indx
```

```
    INTEGER(I4B), DIMENSION(size(indx)) :: rank
    END FUNCTION rank
END INTERFACE
INTERFACE
    FUNCTION irbit1(iseed)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: iseed
    INTEGER(I4B) :: irbit1
    END FUNCTION irbit1
END INTERFACE
INTERFACE
    FUNCTION irbit2(iseed)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: iseed
    INTEGER(I4B) :: irbit2
    END FUNCTION irbit2
END INTERFACE
INTERFACE
    SUBROUTINE jacobi(a,d,v,nrot)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: nrot
    REAL(SP), DIMENSION(:), INTENT(OUT) :: d
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: v
    END SUBROUTINE jacobi
END INTERFACE
INTERFACE
    SUBROUTINE jacobn(x,y,dfdx,dfdy)
    USE nrtype
    REAL(SP), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(IN) :: y
    REAL(SP), DIMENSION(:), INTENT(OUT) :: dfdx
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: dfdy
    END SUBROUTINE jacobn
END INTERFACE
INTERFACE
    FUNCTION julday(mm,id,iyyy)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: mm,id,iyyy
    INTEGER(I4B) :: julday
    END FUNCTION julday
END INTERFACE
INTERFACE
    SUBROUTINE kendl1(data1,data2,tau,z,prob)
    USE nrtype
    REAL(SP), INTENT(OUT) :: tau,z,prob
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    END SUBROUTINE kendl1
END INTERFACE
INTERFACE
    SUBROUTINE kendl2(tab,tau,z,prob)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: tab
    REAL(SP), INTENT(OUT) :: tau,z,prob
    END SUBROUTINE kendl2
END INTERFACE
INTERFACE
    FUNCTION kermom(y,m)
    USE nrtype
    REAL(DP), INTENT(IN) :: y
    INTEGER(I4B), INTENT(IN) :: m
    REAL(DP), DIMENSION(m) :: kermom
    END FUNCTION kermom
END INTERFACE
```

```
INTERFACE
    SUBROUTINE ks2d1s(x1,y1,quadvl,d1,prob)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x1,y1
    REAL(SP), INTENT(OUT) :: d1,prob
    INTERFACE
        SUBROUTINE quadvl(x,y,fa,fb,fc,fd)
        USE nrtype
        REAL(SP), INTENT(IN) :: x,y
        REAL(SP), INTENT(OUT) :: fa,fb,fc,fd
        END SUBROUTINE quadvl
    END INTERFACE
    END SUBROUTINE ks2d1s
END INTERFACE
INTERFACE
    SUBROUTINE ks2d2s(x1,y1,x2,y2,d,prob)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x1,y1,x2,y2
    REAL(SP), INTENT(OUT) :: d,prob
    END SUBROUTINE ks2d2s
END INTERFACE
INTERFACE
    SUBROUTINE ksone(data,func,d,prob)
    USE nrtype
    REAL(SP), INTENT(OUT) :: d,prob
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: data
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE ksone
END INTERFACE
INTERFACE
    SUBROUTINE kstwo(data1,data2,d,prob)
    USE nrtype
    REAL(SP), INTENT(OUT) :: d,prob
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    END SUBROUTINE kstwo
END INTERFACE
INTERFACE
    SUBROUTINE laguer(a,x,its)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: its
    COMPLEX(SPC), INTENT(INOUT) :: x
    COMPLEX(SPC), DIMENSION(:), INTENT(IN) :: a
    END SUBROUTINE laguer
END INTERFACE
INTERFACE
    SUBROUTINE lfit(x,y,sig,a,maska,covar,chisq,funcs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,sig
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
    LOGICAL(LGT), DIMENSION(:), INTENT(IN) :: maska
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: covar
    REAL(SP), INTENT(OUT) :: chisq
    INTERFACE
        SUBROUTINE funcs(x,arr)
        USE nrtype
        REAL(SP),INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(OUT) :: arr
        END SUBROUTINE funcs
```

```
    END INTERFACE
    END SUBROUTINE lfit
END INTERFACE
INTERFACE
    SUBROUTINE linbcg(b,x,itol,tol,itmax,iter,err)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(IN) :: b
    REAL(DP), DIMENSION(:), INTENT(INOUT) :: x
    INTEGER(I4B), INTENT(IN) :: itol,itmax
    REAL(DP), INTENT(IN) :: tol
    INTEGER(I4B), INTENT(OUT) :: iter
    REAL(DP), INTENT(OUT) :: err
    END SUBROUTINE linbcg
END INTERFACE
INTERFACE
    SUBROUTINE linmin(p,xi,fret)
    USE nrtype
    REAL(SP), INTENT(OUT) :: fret
    REAL(SP), DIMENSION(:), TARGET, INTENT(INOUT) :: p,xi
    END SUBROUTINE linmin
END INTERFACE
INTERFACE
    SUBROUTINE lnsrch(xold,fold,g,p,x,f,stpmax,check,func)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: xold,g
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: p
    REAL(SP), INTENT(IN) :: fold,stpmax
    REAL(SP), DIMENSION(:), INTENT(OUT) :: x
    REAL(SP), INTENT(OUT) :: f
    LOGICAL(LGT), INTENT(OUT) :: check
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP) :: func
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE lnsrch
END INTERFACE
INTERFACE
    FUNCTION locate(xx,x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: xx
    REAL(SP), INTENT(IN) :: x
    INTEGER(I4B) :: locate
    END FUNCTION locate
END INTERFACE
INTERFACE
    FUNCTION lop(u)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: u
    REAL(DP), DIMENSION(size(u,1),size(u,1)) :: lop
    END FUNCTION lop
END INTERFACE
INTERFACE
    SUBROUTINE lubksb(a,indx,b)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: a
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indx
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: b
    END SUBROUTINE lubksb
END INTERFACE
INTERFACE
    SUBROUTINE ludcmp(a,indx,d)
```

```
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: indx
    REAL(SP), INTENT(OUT) :: d
    END SUBROUTINE ludcmp
END INTERFACE
INTERFACE
    SUBROUTINE machar(ibeta,it,irnd,ngrd,machep,negep,iexp,minexp,&
        maxexp,eps,epsneg,xmin,xmax)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: ibeta,iexp,irnd,it,machep,maxexp,&
        minexp,negep,ngrd
    REAL(SP), INTENT(OUT) :: eps,epsneg,xmax,xmin
    END SUBROUTINE machar
END INTERFACE
INTERFACE
    SUBROUTINE medfit(x,y,a,b,abdev)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), INTENT(OUT) :: a,b,abdev
    END SUBROUTINE medfit
END INTERFACE
INTERFACE
    SUBROUTINE memcof(data,xms,d)
    USE nrtype
    REAL(SP), INTENT(OUT) :: xms
    REAL(SP), DIMENSION(:), INTENT(IN) :: data
    REAL(SP), DIMENSION(:), INTENT(OUT) :: d
    END SUBROUTINE memcof
END INTERFACE
INTERFACE
    SUBROUTINE mgfas(u,maxcyc)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: u
    INTEGER(I4B), INTENT(IN) :: maxcyc
    END SUBROUTINE mgfas
END INTERFACE
INTERFACE
    SUBROUTINE mglin(u,ncycle)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: u
    INTEGER(I4B), INTENT(IN) :: ncycle
    END SUBROUTINE mglin
END INTERFACE
INTERFACE
    SUBROUTINE midexp(funk,aa,bb,s,n)
    USE nrtype
    REAL(SP), INTENT(IN) :: aa,bb
    REAL(SP), INTENT(INOUT) :: s
    INTEGER(I4B), INTENT(IN) :: n
    INTERFACE
        FUNCTION funk(x)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: funk
        END FUNCTION funk
    END INTERFACE
    END SUBROUTINE midexp
END INTERFACE
INTERFACE
    SUBROUTINE midinf(funk,aa,bb,s,n)
    USE nrtype
    REAL(SP), INTENT(IN) :: aa,bb
    REAL(SP), INTENT(INOUT) :: s
```

```
        INTEGER(I4B), INTENT(IN) :: n
        INTERFACE
            FUNCTION funk(x)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: x
            REAL(SP), DIMENSION(size(x)) :: funk
            END FUNCTION funk
        END INTERFACE
        END SUBROUTINE midinf
    END INTERFACE
    INTERFACE
        SUBROUTINE midpnt(func,a,b,s,n)
        USE nrtype
        REAL(SP), INTENT(IN) :: a,b
        REAL(SP), INTENT(INOUT) :: s
        INTEGER(I4B), INTENT(IN) :: n
        INTERFACE
            FUNCTION func(x)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: x
            REAL(SP), DIMENSION(size(x)) :: func
            END FUNCTION func
        END INTERFACE
        END SUBROUTINE midpnt
    END INTERFACE
    INTERFACE
        SUBROUTINE midsql(funk,aa,bb,s,n)
        USE nrtype
        REAL(SP), INTENT(IN) :: aa,bb
        REAL(SP), INTENT(INOUT) :: s
        INTEGER(I4B), INTENT(IN) :: n
        INTERFACE
            FUNCTION funk(x)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: x
            REAL(SP), DIMENSION(size(x)) :: funk
            END FUNCTION funk
        END INTERFACE
        END SUBROUTINE midsql
    END INTERFACE
    INTERFACE
        SUBROUTINE midsqu(funk,aa,bb,s,n)
        USE nrtype
        REAL(SP), INTENT(IN) :: aa,bb
        REAL(SP), INTENT(INOUT) :: s
        INTEGER(I4B), INTENT(IN) :: n
        INTERFACE
            FUNCTION funk(x)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: x
            REAL(SP), DIMENSION(size(x)) :: funk
            END FUNCTION funk
        END INTERFACE
        END SUBROUTINE midsqu
    END INTERFACE
    INTERFACE
        RECURSIVE SUBROUTINE miser(func,regn,ndim,npts,dith,ave,var)
        USE nrtype
        INTERFACE
            FUNCTION func(x)
            USE nrtype
            REAL(SP) :: func
            REAL(SP), DIMENSION(:), INTENT(IN) :: x
            END FUNCTION func
```

```
    END INTERFACE
    REAL(SP), DIMENSION(:), INTENT(IN) :: regn
    INTEGER(I4B), INTENT(IN) :: ndim,npts
    REAL(SP), INTENT(IN) :: dith
    REAL(SP), INTENT(OUT) :: ave,var
    END SUBROUTINE miser
END INTERFACE
INTERFACE
    SUBROUTINE mmid(y,dydx,xs,htot,nstep,yout,derivs)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: nstep
    REAL(SP), INTENT(IN) :: xs,htot
    REAL(SP), DIMENSION(:), INTENT(IN) :: y,dydx
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yout
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE mmid
END INTERFACE
INTERFACE
    SUBROUTINE mnbrak(ax,bx,cx,fa,fb,fc,func)
    USE nrtype
    REAL(SP), INTENT(INOUT) :: ax,bx
    REAL(SP), INTENT(OUT) :: cx,fa,fb,fc
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE mnbrak
END INTERFACE
INTERFACE
    SUBROUTINE mnewt(ntrial,x,tolx,tolf,usrfun)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: ntrial
    REAL(SP), INTENT(IN) :: tolx,tolf
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
    INTERFACE
        SUBROUTINE usrfun(x,fvec,fjac)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(OUT) :: fvec
        REAL(SP), DIMENSION(:,:), INTENT(OUT) :: fjac
        END SUBROUTINE usrfun
    END INTERFACE
    END SUBROUTINE mnewt
END INTERFACE
INTERFACE
    SUBROUTINE moment(data,ave,adev,sdev,var,skew,curt)
    USE nrtype
    REAL(SP), INTENT(OUT) :: ave,adev,sdev,var,skew,curt
    REAL(SP), DIMENSION(:), INTENT(IN) :: data
    END SUBROUTINE moment
END INTERFACE
INTERFACE
    SUBROUTINE mp2dfr(a,s,n,m)
    USE nrtype
```

```
    INTEGER(I4B), INTENT(IN) :: n
    INTEGER(I4B), INTENT(OUT) :: m
    CHARACTER(1), DIMENSION(:), INTENT(INOUT) :: a
    CHARACTER(1), DIMENSION(:), INTENT(OUT) :: s
    END SUBROUTINE mp2dfr
END INTERFACE
INTERFACE
    SUBROUTINE mpdiv(q,r,u,v,n,m)
    USE nrtype
    CHARACTER(1), DIMENSION(:), INTENT(OUT) :: q,r
    CHARACTER(1), DIMENSION(:), INTENT(IN) :: u,v
    INTEGER(I4B), INTENT(IN) :: n,m
    END SUBROUTINE mpdiv
END INTERFACE
INTERFACE
    SUBROUTINE mpinv(u,v,n,m)
    USE nrtype
    CHARACTER(1), DIMENSION(:), INTENT(OUT) :: u
    CHARACTER(1), DIMENSION(:), INTENT(IN) :: v
    INTEGER(I4B), INTENT(IN) :: n,m
    END SUBROUTINE mpinv
END INTERFACE
INTERFACE
    SUBROUTINE mpmul(w,u,v,n,m)
    USE nrtype
    CHARACTER(1), DIMENSION(:), INTENT(IN) :: u,v
    CHARACTER(1), DIMENSION(:), INTENT(OUT) :: w
    INTEGER(I4B), INTENT(IN) :: n,m
    END SUBROUTINE mpmul
END INTERFACE
INTERFACE
    SUBROUTINE mppi(n)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    END SUBROUTINE mppi
END INTERFACE
INTERFACE
    SUBROUTINE mprove(a,alud,indx,b,x)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: a,alud
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indx
    REAL(SP), DIMENSION(:), INTENT(IN) :: b
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
    END SUBROUTINE mprove
END INTERFACE
INTERFACE
    SUBROUTINE mpsqrt(w,u,v,n,m)
    USE nrtype
    CHARACTER(1), DIMENSION(:), INTENT(OUT) :: w,u
    CHARACTER(1), DIMENSION(:), INTENT(IN) :: v
    INTEGER(I4B), INTENT(IN) :: n,m
    END SUBROUTINE mpsqrt
END INTERFACE
INTERFACE
    SUBROUTINE mrqcof(x,y,sig,a,maska,alpha,beta,chisq,funcs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,a,sig
    REAL(SP), DIMENSION(:), INTENT(OUT) :: beta
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: alpha
    REAL(SP), INTENT(OUT) :: chisq
    LOGICAL(LGT), DIMENSION(:), INTENT(IN) :: maska
    INTERFACE
        SUBROUTINE funcs(x,a,yfit,dyda)
        USE nrtype
```

```
        REAL(SP), DIMENSION(:), INTENT(IN) :: x,a
        REAL(SP), DIMENSION(:), INTENT(OUT) :: yfit
        REAL(SP), DIMENSION(:,:), INTENT(OUT) :: dyda
        END SUBROUTINE funcs
    END INTERFACE
    END SUBROUTINE mrqcof
END INTERFACE
INTERFACE
    SUBROUTINE mrqmin(x,y,sig,a,maska,covar,alpha,chisq,funcs,alamda)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,sig
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: covar,alpha
    REAL(SP), INTENT(OUT) :: chisq
    REAL(SP), INTENT(INOUT) :: alamda
    LOGICAL(LGT), DIMENSION(:), INTENT(IN) :: maska
    INTERFACE
        SUBROUTINE funcs(x,a,yfit,dyda)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x,a
        REAL(SP), DIMENSION(:), INTENT(OUT) :: yfit
        REAL(SP), DIMENSION(:,:), INTENT(OUT) :: dyda
        END SUBROUTINE funcs
    END INTERFACE
    END SUBROUTINE mrqmin
END INTERFACE
INTERFACE
    SUBROUTINE newt(x,check)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: x
    LOGICAL(LGT), INTENT(OUT) :: check
    END SUBROUTINE newt
END INTERFACE
INTERFACE
    SUBROUTINE odeint(ystart,x1,x2,eps,h1,hmin,derivs,rkqs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: ystart
    REAL(SP), INTENT(IN) :: x1,x2,eps,h1,hmin
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs

        SUBROUTINE rkqs(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
        REAL(SP), DIMENSION(:), INTENT(IN) :: dydx,yscal
        REAL(SP), INTENT(INOUT) :: x
        REAL(SP), INTENT(IN) :: htry,eps
        REAL(SP), INTENT(OUT) :: hdid,hnext
            INTERFACE
            SUBROUTINE derivs(x,y,dydx)
                USE nrtype
                REAL(SP), INTENT(IN) :: x
                REAL(SP), DIMENSION(:), INTENT(IN) :: y
                REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
                END SUBROUTINE derivs
            END INTERFACE
        END SUBROUTINE rkqs
    END INTERFACE
    END SUBROUTINE odeint
```

```
END INTERFACE
INTERFACE
    SUBROUTINE orthog(anu,alpha,beta,a,b)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: anu,alpha,beta
    REAL(SP), DIMENSION(:), INTENT(OUT) :: a,b
    END SUBROUTINE orthog
END INTERFACE
INTERFACE
    SUBROUTINE pade(cof,resid)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(INOUT) :: cof
    REAL(SP), INTENT(OUT) :: resid
    END SUBROUTINE pade
END INTERFACE
INTERFACE
    FUNCTION pccheb(d)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: d
    REAL(SP), DIMENSION(size(d)) :: pccheb
    END FUNCTION pccheb
END INTERFACE
INTERFACE
    SUBROUTINE pcshft(a,b,d)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: d
    END SUBROUTINE pcshft
END INTERFACE
INTERFACE
    SUBROUTINE pearsn(x,y,r,prob,z)
    USE nrtype
    REAL(SP), INTENT(OUT) :: r,prob,z
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    END SUBROUTINE pearsn
END INTERFACE
INTERFACE
    SUBROUTINE period(x,y,ofac,hifac,px,py,jmax,prob)
    USE nrtype
    INTEGER(I4B), INTENT(OUT) :: jmax
    REAL(SP), INTENT(IN) :: ofac,hifac
    REAL(SP), INTENT(OUT) :: prob
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), DIMENSION(:), POINTER :: px,py
    END SUBROUTINE period
END INTERFACE
INTERFACE plgndr
    FUNCTION plgndr_s(l,m,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: l,m
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: plgndr_s
    END FUNCTION plgndr_s

    FUNCTION plgndr_v(l,m,x)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: l,m
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(size(x)) :: plgndr_v
    END FUNCTION plgndr_v
END INTERFACE
INTERFACE
    FUNCTION poidev(xm)
    USE nrtype
```

```
    REAL(SP), INTENT(IN) :: xm
    REAL(SP) :: poidev
    END FUNCTION poidev
END INTERFACE
INTERFACE
    FUNCTION polcoe(x,y)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), DIMENSION(size(x)) :: polcoe
    END FUNCTION polcoe
END INTERFACE
INTERFACE
    FUNCTION polcof(xa,ya)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: xa,ya
    REAL(SP), DIMENSION(size(xa)) :: polcof
    END FUNCTION polcof
END INTERFACE
INTERFACE
    SUBROUTINE poldiv(u,v,q,r)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: u,v
    REAL(SP), DIMENSION(:), INTENT(OUT) :: q,r
    END SUBROUTINE poldiv
END INTERFACE
INTERFACE
    SUBROUTINE polin2(x1a,x2a,ya,x1,x2,y,dy)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x1a,x2a
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: ya
    REAL(SP), INTENT(IN) :: x1,x2
    REAL(SP), INTENT(OUT) :: y,dy
    END SUBROUTINE polin2
END INTERFACE
INTERFACE
    SUBROUTINE polint(xa,ya,x,y,dy)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: xa,ya
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: y,dy
    END SUBROUTINE polint
END INTERFACE
INTERFACE
    SUBROUTINE powell(p,xi,ftol,iter,fret)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: p
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: xi
    INTEGER(I4B), INTENT(OUT) :: iter
    REAL(SP), INTENT(IN) :: ftol
    REAL(SP), INTENT(OUT) :: fret
    END SUBROUTINE powell
END INTERFACE
INTERFACE
    FUNCTION predic(data,d,nfut)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data,d
    INTEGER(I4B), INTENT(IN) :: nfut
    REAL(SP), DIMENSION(nfut) :: predic
    END FUNCTION predic
END INTERFACE
INTERFACE
    FUNCTION probks(alam)
    USE nrtype
    REAL(SP), INTENT(IN) :: alam
```

```
    REAL(SP) :: probks
    END FUNCTION probks
END INTERFACE
INTERFACE psdes
    SUBROUTINE psdes_s(lword,rword)
    USE nrtype
    INTEGER(I4B), INTENT(INOUT) :: lword,rword
    END SUBROUTINE psdes_s

    SUBROUTINE psdes_v(lword,rword)
    USE nrtype
    INTEGER(I4B), DIMENSION(:), INTENT(INOUT) :: lword,rword
    END SUBROUTINE psdes_v
END INTERFACE
INTERFACE
    SUBROUTINE pwt(a,isign)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE pwt
END INTERFACE
INTERFACE
    SUBROUTINE pwtset(n)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    END SUBROUTINE pwtset
END INTERFACE
INTERFACE pythag
    FUNCTION pythag_dp(a,b)
    USE nrtype
    REAL(DP), INTENT(IN) :: a,b
    REAL(DP) :: pythag_dp
    END FUNCTION pythag_dp

    FUNCTION pythag_sp(a,b)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP) :: pythag_sp
    END FUNCTION pythag_sp
END INTERFACE
INTERFACE
    SUBROUTINE pzextr(iest,xest,yest,yz,dy)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: iest
    REAL(SP), INTENT(IN) :: xest
    REAL(SP), DIMENSION(:), INTENT(IN) :: yest
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yz,dy
    END SUBROUTINE pzextr
END INTERFACE
INTERFACE
    SUBROUTINE qrdcmp(a,c,d,sing)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:), INTENT(OUT) :: c,d
    LOGICAL(LGT), INTENT(OUT) :: sing
    END SUBROUTINE qrdcmp
END INTERFACE
INTERFACE
    FUNCTION qromb(func,a,b)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP) :: qromb
    INTERFACE
        FUNCTION func(x)
        USE nrtype
```

```
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION qromb
END INTERFACE
INTERFACE
    FUNCTION qromo(func,a,b,choose)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP) :: qromo
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    INTERFACE
        SUBROUTINE choose(funk,aa,bb,s,n)
        USE nrtype
        REAL(SP), INTENT(IN) :: aa,bb
        REAL(SP), INTENT(INOUT) :: s
        INTEGER(I4B), INTENT(IN) :: n
        INTERFACE
            FUNCTION funk(x)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: x
            REAL(SP), DIMENSION(size(x)) :: funk
            END FUNCTION funk
        END INTERFACE
        END SUBROUTINE choose
    END INTERFACE
    END FUNCTION qromo
END INTERFACE
INTERFACE
    SUBROUTINE qroot(p,b,c,eps)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: p
    REAL(SP), INTENT(INOUT) :: b,c
    REAL(SP), INTENT(IN) :: eps
    END SUBROUTINE qroot
END INTERFACE
INTERFACE
    SUBROUTINE qrsolv(a,c,d,b)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: a
    REAL(SP), DIMENSION(:), INTENT(IN) :: c,d
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: b
    END SUBROUTINE qrsolv
END INTERFACE
INTERFACE
    SUBROUTINE qrupdt(r,qt,u,v)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: r,qt
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: u
    REAL(SP), DIMENSION(:), INTENT(IN) :: v
    END SUBROUTINE qrupdt
END INTERFACE
INTERFACE
    FUNCTION qsimp(func,a,b)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP) :: qsimp
```

```
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION qsimp
END INTERFACE
INTERFACE
    FUNCTION qtrap(func,a,b)
    USE nrtype
    REAL(SP), INTENT(IN) :: a,b
    REAL(SP) :: qtrap
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: x
        REAL(SP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION qtrap
END INTERFACE
INTERFACE
    SUBROUTINE quadct(x,y,xx,yy,fa,fb,fc,fd)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y
    REAL(SP), DIMENSION(:), INTENT(IN) :: xx,yy
    REAL(SP), INTENT(OUT) :: fa,fb,fc,fd
    END SUBROUTINE quadct
END INTERFACE
INTERFACE
    SUBROUTINE quadmx(a)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: a
    END SUBROUTINE quadmx
END INTERFACE
INTERFACE
    SUBROUTINE quadvl(x,y,fa,fb,fc,fd)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y
    REAL(SP), INTENT(OUT) :: fa,fb,fc,fd
    END SUBROUTINE quadvl
END INTERFACE
INTERFACE
    FUNCTION ran(idum)
    INTEGER(selected_int_kind(9)), INTENT(INOUT) :: idum
    REAL :: ran
    END FUNCTION ran
END INTERFACE
INTERFACE ran0
    SUBROUTINE ran0_s(harvest)
    USE nrtype
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE ran0_s

    SUBROUTINE ran0_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: harvest
    END SUBROUTINE ran0_v
END INTERFACE
INTERFACE ran1
    SUBROUTINE ran1_s(harvest)
    USE nrtype
```

```
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE ran1_s

    SUBROUTINE ran1_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: harvest
    END SUBROUTINE ran1_v
END INTERFACE
INTERFACE ran2
    SUBROUTINE ran2_s(harvest)
    USE nrtype
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE ran2_s

    SUBROUTINE ran2_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: harvest
    END SUBROUTINE ran2_v
END INTERFACE
INTERFACE ran3
    SUBROUTINE ran3_s(harvest)
    USE nrtype
    REAL(SP), INTENT(OUT) :: harvest
    END SUBROUTINE ran3_s

    SUBROUTINE ran3_v(harvest)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: harvest
    END SUBROUTINE ran3_v
END INTERFACE
INTERFACE
    SUBROUTINE ratint(xa,ya,x,y,dy)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: xa,ya
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: y,dy
    END SUBROUTINE ratint
END INTERFACE
INTERFACE
    SUBROUTINE ratlsq(func,a,b,mm,kk,cof,dev)
    USE nrtype
    REAL(DP), INTENT(IN) :: a,b
    INTEGER(I4B), INTENT(IN) :: mm,kk
    REAL(DP), DIMENSION(:), INTENT(OUT) :: cof
    REAL(DP), INTENT(OUT) :: dev
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(DP), DIMENSION(:), INTENT(IN) :: x
        REAL(DP), DIMENSION(size(x)) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE ratlsq
END INTERFACE
INTERFACE ratval
    FUNCTION ratval_s(x,cof,mm,kk)
    USE nrtype
    REAL(DP), INTENT(IN) :: x
    INTEGER(I4B), INTENT(IN) :: mm,kk
    REAL(DP), DIMENSION(mm+kk+1), INTENT(IN) :: cof
    REAL(DP) :: ratval_s
    END FUNCTION ratval_s

    FUNCTION ratval_v(x,cof,mm,kk)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(IN) :: x
```

```
    INTEGER(I4B), INTENT(IN) :: mm,kk
    REAL(DP), DIMENSION(mm+kk+1), INTENT(IN) :: cof
    REAL(DP), DIMENSION(size(x)) :: ratval_v
    END FUNCTION ratval_v
END INTERFACE
INTERFACE rc
    FUNCTION rc_s(x,y)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y
    REAL(SP) :: rc_s
    END FUNCTION rc_s

    FUNCTION rc_v(x,y)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), DIMENSION(size(x)) :: rc_v
    END FUNCTION rc_v
END INTERFACE
INTERFACE rd
    FUNCTION rd_s(x,y,z)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y,z
    REAL(SP) :: rd_s
    END FUNCTION rd_s

    FUNCTION rd_v(x,y,z)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,z
    REAL(SP), DIMENSION(size(x)) :: rd_v
    END FUNCTION rd_v
END INTERFACE
INTERFACE realft
    SUBROUTINE realft_dp(data,isign,zdata)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    COMPLEX(DPC), DIMENSION(:), OPTIONAL, TARGET :: zdata
    END SUBROUTINE realft_dp

    SUBROUTINE realft_sp(data,isign,zdata)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: data
    INTEGER(I4B), INTENT(IN) :: isign
    COMPLEX(SPC), DIMENSION(:), OPTIONAL, TARGET :: zdata
    END SUBROUTINE realft_sp
END INTERFACE
INTERFACE
    RECURSIVE FUNCTION recur1(a,b) RESULT(u)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,b
    REAL(SP), DIMENSION(size(a)) :: u
    END FUNCTION recur1
END INTERFACE
INTERFACE
    FUNCTION recur2(a,b,c)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,b,c
    REAL(SP), DIMENSION(size(a)) :: recur2
    END FUNCTION recur2
END INTERFACE
INTERFACE
    SUBROUTINE relax(u,rhs)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: u
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: rhs
    END SUBROUTINE relax
```

```
END INTERFACE
INTERFACE
    SUBROUTINE relax2(u,rhs)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: u
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: rhs
    END SUBROUTINE relax2
END INTERFACE
INTERFACE
FUNCTION resid(u,rhs)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: u,rhs
    REAL(DP), DIMENSION(size(u,1),size(u,1)) :: resid
    END FUNCTION resid
END INTERFACE
INTERFACE rf
    FUNCTION rf_s(x,y,z)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y,z
    REAL(SP) :: rf_s
    END FUNCTION rf_s

    FUNCTION rf_v(x,y,z)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,z
    REAL(SP), DIMENSION(size(x)) :: rf_v
    END FUNCTION rf_v
END INTERFACE
INTERFACE rj
    FUNCTION rj_s(x,y,z,p)
    USE nrtype
    REAL(SP), INTENT(IN) :: x,y,z,p
    REAL(SP) :: rj_s
    END FUNCTION rj_s

    FUNCTION rj_v(x,y,z,p)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,z,p
    REAL(SP), DIMENSION(size(x)) :: rj_v
    END FUNCTION rj_v
END INTERFACE
INTERFACE
    SUBROUTINE rk4(y,dydx,x,h,yout,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: y,dydx
    REAL(SP), INTENT(IN) :: x,h
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yout
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE rk4
END INTERFACE
INTERFACE
    SUBROUTINE rkck(y,dydx,x,h,yout,yerr,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: y,dydx
    REAL(SP), INTENT(IN) :: x,h
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yout,yerr
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
```

```
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE rkck
END INTERFACE
INTERFACE
    SUBROUTINE rkdumb(vstart,x1,x2,nstep,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: vstart
    REAL(SP), INTENT(IN) :: x1,x2
    INTEGER(I4B), INTENT(IN) :: nstep
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE rkdumb
END INTERFACE
INTERFACE
    SUBROUTINE rkqs(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:), INTENT(IN) :: dydx,yscal
    REAL(SP), INTENT(INOUT) :: x
    REAL(SP), INTENT(IN) :: htry,eps
    REAL(SP), INTENT(OUT) :: hdid,hnext
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE rkqs
END INTERFACE
INTERFACE
    SUBROUTINE rlft2(data,spec,speq,isign)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: data
    COMPLEX(SPC), DIMENSION(:,:), INTENT(OUT) :: spec
    COMPLEX(SPC), DIMENSION(:), INTENT(OUT) :: speq
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE rlft2
END INTERFACE
INTERFACE
    SUBROUTINE rlft3(data,spec,speq,isign)
    USE nrtype
    REAL(SP), DIMENSION(:,:,:), INTENT(INOUT) :: data
    COMPLEX(SPC), DIMENSION(:,:,:), INTENT(OUT) :: spec
    COMPLEX(SPC), DIMENSION(:,:), INTENT(OUT) :: speq
    INTEGER(I4B), INTENT(IN) :: isign
    END SUBROUTINE rlft3
END INTERFACE
INTERFACE
    SUBROUTINE rotate(r,qt,i,a,b)
    USE nrtype
    REAL(SP), DIMENSION(:,:), TARGET, INTENT(INOUT) :: r,qt
```

```
    INTEGER(I4B), INTENT(IN) :: i
    REAL(SP), INTENT(IN) :: a,b
    END SUBROUTINE rotate
END INTERFACE
INTERFACE
    SUBROUTINE rsolv(a,d,b)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: a
    REAL(SP), DIMENSION(:), INTENT(IN) :: d
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: b
    END SUBROUTINE rsolv
END INTERFACE
INTERFACE
    FUNCTION rstrct(uf)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: uf
    REAL(DP), DIMENSION((size(uf,1)+1)/2,(size(uf,1)+1)/2) :: rstrct
    END FUNCTION rstrct
END INTERFACE
INTERFACE
    FUNCTION rtbis(func,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtbis
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION rtbis
END INTERFACE
INTERFACE
    FUNCTION rtflsp(func,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtflsp
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION rtflsp
END INTERFACE
INTERFACE
    FUNCTION rtnewt(funcd,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtnewt
    INTERFACE
        SUBROUTINE funcd(x,fval,fderiv)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), INTENT(OUT) :: fval,fderiv
        END SUBROUTINE funcd
    END INTERFACE
    END FUNCTION rtnewt
END INTERFACE
INTERFACE
    FUNCTION rtsafe(funcd,x1,x2,xacc)
    USE nrtype
```

```
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtsafe
    INTERFACE
        SUBROUTINE funcd(x,fval,fderiv)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), INTENT(OUT) :: fval,fderiv
        END SUBROUTINE funcd
    END INTERFACE
    END FUNCTION rtsafe
END INTERFACE
INTERFACE
    FUNCTION rtsec(func,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: rtsec
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION rtsec
END INTERFACE
INTERFACE
    SUBROUTINE rzextr(iest,xest,yest,yz,dy)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: iest
    REAL(SP), INTENT(IN) :: xest
    REAL(SP), DIMENSION(:), INTENT(IN) :: yest
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yz,dy
    END SUBROUTINE rzextr
END INTERFACE
INTERFACE
    FUNCTION savgol(nl,nrr,ld,m)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: nl,nrr,ld,m
    REAL(SP), DIMENSION(nl+nrr+1) :: savgol
    END FUNCTION savgol
END INTERFACE
INTERFACE
    SUBROUTINE scrsho(func)
    USE nrtype
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE scrsho
END INTERFACE
INTERFACE
    FUNCTION select(k,arr)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: k
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    REAL(SP) :: select
    END FUNCTION select
END INTERFACE
INTERFACE
    FUNCTION select_bypack(k,arr)
    USE nrtype
```

```
    INTEGER(I4B), INTENT(IN) :: k
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    REAL(SP) :: select_bypack
    END FUNCTION select_bypack
END INTERFACE
INTERFACE
    SUBROUTINE select_heap(arr,heap)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: arr
    REAL(SP), DIMENSION(:), INTENT(OUT) :: heap
    END SUBROUTINE select_heap
END INTERFACE
INTERFACE
    FUNCTION select_inplace(k,arr)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: k
    REAL(SP), DIMENSION(:), INTENT(IN) :: arr
    REAL(SP) :: select_inplace
    END FUNCTION select_inplace
END INTERFACE
INTERFACE
    SUBROUTINE simplx(a,m1,m2,m3,icase,izrov,iposv)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    INTEGER(I4B), INTENT(IN) :: m1,m2,m3
    INTEGER(I4B), INTENT(OUT) :: icase
    INTEGER(I4B), DIMENSION(:), INTENT(OUT) :: izrov,iposv
    END SUBROUTINE simplx
END INTERFACE
INTERFACE
    SUBROUTINE simpr(y,dydx,dfdx,dfdy,xs,htot,nstep,yout,derivs)
    USE nrtype
    REAL(SP), INTENT(IN) :: xs,htot
    REAL(SP), DIMENSION(:), INTENT(IN) :: y,dydx,dfdx
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: dfdy
    INTEGER(I4B), INTENT(IN) :: nstep
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yout
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE simpr
END INTERFACE
INTERFACE
    SUBROUTINE sinft(y)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    END SUBROUTINE sinft
END INTERFACE
INTERFACE
    SUBROUTINE slvsm2(u,rhs)
    USE nrtype
    REAL(DP), DIMENSION(3,3), INTENT(OUT) :: u
    REAL(DP), DIMENSION(3,3), INTENT(IN) :: rhs
    END SUBROUTINE slvsm2
END INTERFACE
INTERFACE
    SUBROUTINE slvsml(u,rhs)
    USE nrtype
    REAL(DP), DIMENSION(3,3), INTENT(OUT) :: u
```

```
    REAL(DP), DIMENSION(3,3), INTENT(IN) :: rhs
    END SUBROUTINE slvsml
END INTERFACE
INTERFACE
    SUBROUTINE sncndn(uu,emmc,sn,cn,dn)
    USE nrtype
    REAL(SP), INTENT(IN) :: uu,emmc
    REAL(SP), INTENT(OUT) :: sn,cn,dn
    END SUBROUTINE sncndn
END INTERFACE
INTERFACE
    FUNCTION snrm(sx,itol)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(IN) :: sx
    INTEGER(I4B), INTENT(IN) :: itol
    REAL(DP) :: snrm
    END FUNCTION snrm
END INTERFACE
INTERFACE
    SUBROUTINE sobseq(x,init)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: x
    INTEGER(I4B), OPTIONAL, INTENT(IN) :: init
    END SUBROUTINE sobseq
END INTERFACE
INTERFACE
    SUBROUTINE solvde(itmax,conv,slowc,scalv,indexv,nb,y)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: itmax,nb
    REAL(SP), INTENT(IN) :: conv,slowc
    REAL(SP), DIMENSION(:), INTENT(IN) :: scalv
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: indexv
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: y
    END SUBROUTINE solvde
END INTERFACE
INTERFACE
    SUBROUTINE sor(a,b,c,d,e,f,u,rjac)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: a,b,c,d,e,f
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: u
    REAL(DP), INTENT(IN) :: rjac
    END SUBROUTINE sor
END INTERFACE
INTERFACE
    SUBROUTINE sort(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort
END INTERFACE
INTERFACE
    SUBROUTINE sort2(arr,slave)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr,slave
    END SUBROUTINE sort2
END INTERFACE
INTERFACE
    SUBROUTINE sort3(arr,slave1,slave2)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr,slave1,slave2
    END SUBROUTINE sort3
END INTERFACE
INTERFACE
    SUBROUTINE sort_bypack(arr)
    USE nrtype
```

```
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_bypack
END INTERFACE
INTERFACE
    SUBROUTINE sort_byreshape(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_byreshape
END INTERFACE
INTERFACE
    SUBROUTINE sort_heap(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_heap
END INTERFACE
INTERFACE
    SUBROUTINE sort_pick(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_pick
END INTERFACE
INTERFACE
    SUBROUTINE sort_radix(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_radix
END INTERFACE
INTERFACE
    SUBROUTINE sort_shell(arr)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: arr
    END SUBROUTINE sort_shell
END INTERFACE
INTERFACE
    SUBROUTINE spctrm(p,k,ovrlap,unit,n_window)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(OUT) :: p
    INTEGER(I4B), INTENT(IN) :: k
    LOGICAL(LGT), INTENT(IN) :: ovrlap
    INTEGER(I4B), OPTIONAL, INTENT(IN) :: n_window,unit
    END SUBROUTINE spctrm
END INTERFACE
INTERFACE
    SUBROUTINE spear(data1,data2,d,zd,probd,rs,probrs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    REAL(SP), INTENT(OUT) :: d,zd,probd,rs,probrs
    END SUBROUTINE spear
END INTERFACE
INTERFACE sphbes
    SUBROUTINE sphbes_s(n,x,sj,sy,sjp,syp)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: x
    REAL(SP), INTENT(OUT) :: sj,sy,sjp,syp
    END SUBROUTINE sphbes_s

    SUBROUTINE sphbes_v(n,x,sj,sy,sjp,syp)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), DIMENSION(:), INTENT(IN) :: x
    REAL(SP), DIMENSION(:), INTENT(OUT) :: sj,sy,sjp,syp
    END SUBROUTINE sphbes_v
END INTERFACE
```

```
INTERFACE
    SUBROUTINE splie2(x1a,x2a,ya,y2a)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x1a,x2a
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: ya
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: y2a
    END SUBROUTINE splie2
END INTERFACE
INTERFACE
    FUNCTION splin2(x1a,x2a,ya,y2a,x1,x2)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x1a,x2a
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: ya,y2a
    REAL(SP), INTENT(IN) :: x1,x2
    REAL(SP) :: splin2
    END FUNCTION splin2
END INTERFACE
INTERFACE
    SUBROUTINE spline(x,y,yp1,ypn,y2)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y
    REAL(SP), INTENT(IN) :: yp1,ypn
    REAL(SP), DIMENSION(:), INTENT(OUT) :: y2
    END SUBROUTINE spline
END INTERFACE
INTERFACE
    FUNCTION splint(xa,ya,y2a,x)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: xa,ya,y2a
    REAL(SP), INTENT(IN) :: x
    REAL(SP) :: splint
    END FUNCTION splint
END INTERFACE
INTERFACE sprsax
    SUBROUTINE sprsax_dp(sa,x,b)
    USE nrtype
    TYPE(sprs2_dp), INTENT(IN) :: sa
    REAL(DP), DIMENSION (:), INTENT(IN) :: x
    REAL(DP), DIMENSION (:), INTENT(OUT) :: b
    END SUBROUTINE sprsax_dp

    SUBROUTINE sprsax_sp(sa,x,b)
    USE nrtype
    TYPE(sprs2_sp), INTENT(IN) :: sa
    REAL(SP), DIMENSION (:), INTENT(IN) :: x
    REAL(SP), DIMENSION (:), INTENT(OUT) :: b
    END SUBROUTINE sprsax_sp
END INTERFACE
INTERFACE sprsdiag
    SUBROUTINE sprsdiag_dp(sa,b)
    USE nrtype
    TYPE(sprs2_dp), INTENT(IN) :: sa
    REAL(DP), DIMENSION(:), INTENT(OUT) :: b
    END SUBROUTINE sprsdiag_dp

    SUBROUTINE sprsdiag_sp(sa,b)
    USE nrtype
    TYPE(sprs2_sp), INTENT(IN) :: sa
    REAL(SP), DIMENSION(:), INTENT(OUT) :: b
    END SUBROUTINE sprsdiag_sp
END INTERFACE
INTERFACE sprsin
    SUBROUTINE sprsin_sp(a,thresh,sa)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: a
```

```
    REAL(SP), INTENT(IN) :: thresh
    TYPE(sprs2_sp), INTENT(OUT) :: sa
    END SUBROUTINE sprsin_sp
    SUBROUTINE sprsin_dp(a,thresh,sa)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: a
    REAL(DP), INTENT(IN) :: thresh
    TYPE(sprs2_dp), INTENT(OUT) :: sa
    END SUBROUTINE sprsin_dp
END INTERFACE
INTERFACE
    SUBROUTINE sprstp(sa)
    USE nrtype
    TYPE(sprs2_sp), INTENT(INOUT) :: sa
    END SUBROUTINE sprstp
END INTERFACE
INTERFACE sprstx
    SUBROUTINE sprstx_dp(sa,x,b)
    USE nrtype
    TYPE(sprs2_dp), INTENT(IN) :: sa
    REAL(DP), DIMENSION (:), INTENT(IN) :: x
    REAL(DP), DIMENSION (:), INTENT(OUT) :: b
    END SUBROUTINE sprstx_dp
    SUBROUTINE sprstx_sp(sa,x,b)
    USE nrtype
    TYPE(sprs2_sp), INTENT(IN) :: sa
    REAL(SP), DIMENSION (:), INTENT(IN) :: x
    REAL(SP), DIMENSION (:), INTENT(OUT) :: b
    END SUBROUTINE sprstx_sp
END INTERFACE
INTERFACE
    SUBROUTINE stifbs(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:), INTENT(IN) :: dydx,yscal
    REAL(SP), INTENT(IN) :: htry,eps
    REAL(SP), INTENT(INOUT) :: x
    REAL(SP), INTENT(OUT) :: hdid,hnext
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE stifbs
END INTERFACE
INTERFACE
    SUBROUTINE stiff(y,dydx,x,htry,eps,yscal,hdid,hnext,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: y
    REAL(SP), DIMENSION(:), INTENT(IN) :: dydx,yscal
    REAL(SP), INTENT(INOUT) :: x
    REAL(SP), INTENT(IN) :: htry,eps
    REAL(SP), INTENT(OUT) :: hdid,hnext
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
```

```
    END INTERFACE
    END SUBROUTINE stiff
END INTERFACE
INTERFACE
    SUBROUTINE stoerm(y,d2y,xs,htot,nstep,yout,derivs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: y,d2y
    REAL(SP), INTENT(IN) :: xs,htot
    INTEGER(I4B), INTENT(IN) :: nstep
    REAL(SP), DIMENSION(:), INTENT(OUT) :: yout
    INTERFACE
        SUBROUTINE derivs(x,y,dydx)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP), DIMENSION(:), INTENT(IN) :: y
        REAL(SP), DIMENSION(:), INTENT(OUT) :: dydx
        END SUBROUTINE derivs
    END INTERFACE
    END SUBROUTINE stoerm
END INTERFACE
INTERFACE svbksb
    SUBROUTINE svbksb_dp(u,w,v,b,x)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(IN) :: u,v
    REAL(DP), DIMENSION(:), INTENT(IN) :: w,b
    REAL(DP), DIMENSION(:), INTENT(OUT) :: x
    END SUBROUTINE svbksb_dp

    SUBROUTINE svbksb_sp(u,w,v,b,x)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(IN) :: u,v
    REAL(SP), DIMENSION(:), INTENT(IN) :: w,b
    REAL(SP), DIMENSION(:), INTENT(OUT) :: x
    END SUBROUTINE svbksb_sp
END INTERFACE
INTERFACE svdcmp
    SUBROUTINE svdcmp_dp(a,w,v)
    USE nrtype
    REAL(DP), DIMENSION(:,:), INTENT(INOUT) :: a
    REAL(DP), DIMENSION(:), INTENT(OUT) :: w
    REAL(DP), DIMENSION(:,:), INTENT(OUT) :: v
    END SUBROUTINE svdcmp_dp

    SUBROUTINE svdcmp_sp(a,w,v)
    USE nrtype
    REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
    REAL(SP), DIMENSION(:), INTENT(OUT) :: w
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: v
    END SUBROUTINE svdcmp_sp
END INTERFACE
INTERFACE
    SUBROUTINE svdfit(x,y,sig,a,v,w,chisq,funcs)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: x,y,sig
    REAL(SP), DIMENSION(:), INTENT(OUT) :: a,w
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: v
    REAL(SP), INTENT(OUT) :: chisq
    INTERFACE
        FUNCTION funcs(x,n)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        INTEGER(I4B), INTENT(IN) :: n
        REAL(SP), DIMENSION(n) :: funcs
        END FUNCTION funcs
    END INTERFACE
```

```
        END SUBROUTINE svdfit
    END INTERFACE
    INTERFACE
        SUBROUTINE svdvar(v,w,cvm)
        USE nrtype
        REAL(SP), DIMENSION(:,:), INTENT(IN) :: v
        REAL(SP), DIMENSION(:), INTENT(IN) :: w
        REAL(SP), DIMENSION(:,:), INTENT(OUT) :: cvm
        END SUBROUTINE svdvar
    END INTERFACE
    INTERFACE
        FUNCTION toeplz(r,y)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: r,y
        REAL(SP), DIMENSION(size(y)) :: toeplz
        END FUNCTION toeplz
    END INTERFACE
    INTERFACE
        SUBROUTINE tptest(data1,data2,t,prob)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
        REAL(SP), INTENT(OUT) :: t,prob
        END SUBROUTINE tptest
    END INTERFACE
    INTERFACE
        SUBROUTINE tqli(d,e,z)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(INOUT) :: d,e
        REAL(SP), DIMENSION(:,:), OPTIONAL, INTENT(INOUT) :: z
        END SUBROUTINE tqli
    END INTERFACE
    INTERFACE
        SUBROUTINE trapzd(func,a,b,s,n)
        USE nrtype
        REAL(SP), INTENT(IN) :: a,b
        REAL(SP), INTENT(INOUT) :: s
        INTEGER(I4B), INTENT(IN) :: n
        INTERFACE
            FUNCTION func(x)
            USE nrtype
            REAL(SP), DIMENSION(:), INTENT(IN) :: x
            REAL(SP), DIMENSION(size(x)) :: func
            END FUNCTION func
        END INTERFACE
        END SUBROUTINE trapzd
    END INTERFACE
    INTERFACE
        SUBROUTINE tred2(a,d,e,novectors)
        USE nrtype
        REAL(SP), DIMENSION(:,:), INTENT(INOUT) :: a
        REAL(SP), DIMENSION(:), INTENT(OUT) :: d,e
        LOGICAL(LGT), OPTIONAL, INTENT(IN) :: novectors
        END SUBROUTINE tred2
    END INTERFACE
!   On a purely serial machine, for greater efficiency, remove
!   the generic name tridag from the following interface,
!   and put it on the next one after that.
    INTERFACE tridag
        RECURSIVE SUBROUTINE tridag_par(a,b,c,r,u)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: a,b,c,r
        REAL(SP), DIMENSION(:), INTENT(OUT) :: u
        END SUBROUTINE tridag_par
    END INTERFACE
```

```
INTERFACE
    SUBROUTINE tridag_ser(a,b,c,r,u)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a,b,c,r
    REAL(SP), DIMENSION(:), INTENT(OUT) :: u
    END SUBROUTINE tridag_ser
END INTERFACE
INTERFACE
    SUBROUTINE ttest(data1,data2,t,prob)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    REAL(SP), INTENT(OUT) :: t,prob
    END SUBROUTINE ttest
END INTERFACE
INTERFACE
    SUBROUTINE tutest(data1,data2,t,prob)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    REAL(SP), INTENT(OUT) :: t,prob
    END SUBROUTINE tutest
END INTERFACE
INTERFACE
    SUBROUTINE twofft(data1,data2,fft1,fft2)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: data1,data2
    COMPLEX(SPC), DIMENSION(:), INTENT(OUT) :: fft1,fft2
    END SUBROUTINE twofft
END INTERFACE
INTERFACE
    FUNCTION vander(x,q)
    USE nrtype
    REAL(DP), DIMENSION(:), INTENT(IN) :: x,q
    REAL(DP), DIMENSION(size(x)) :: vander
    END FUNCTION vander
END INTERFACE
INTERFACE
    SUBROUTINE vegas(region,func,init,ncall,itmx,nprn,tgral,sd,chi2a)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: region
    INTEGER(I4B), INTENT(IN) :: init,ncall,itmx,nprn
    REAL(SP), INTENT(OUT) :: tgral,sd,chi2a
    INTERFACE
        FUNCTION func(pt,wgt)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(IN) :: pt
        REAL(SP), INTENT(IN) :: wgt
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE vegas
END INTERFACE
INTERFACE
    SUBROUTINE voltra(t0,h,t,f,g,ak)
    USE nrtype
    REAL(SP), INTENT(IN) :: t0,h
    REAL(SP), DIMENSION(:), INTENT(OUT) :: t
    REAL(SP), DIMENSION(:,:), INTENT(OUT) :: f
    INTERFACE
        FUNCTION g(t)
        USE nrtype
        REAL(SP), INTENT(IN) :: t
        REAL(SP), DIMENSION(:), POINTER :: g
        END FUNCTION g
```

```
        FUNCTION ak(t,s)
        USE nrtype
        REAL(SP), INTENT(IN) :: t,s
        REAL(SP), DIMENSION(:,:), POINTER :: ak
        END FUNCTION ak
    END INTERFACE
    END SUBROUTINE voltra
END INTERFACE
INTERFACE
    SUBROUTINE wt1(a,isign,wtstep)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
    INTEGER(I4B), INTENT(IN) :: isign
    INTERFACE
        SUBROUTINE wtstep(a,isign)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
        INTEGER(I4B), INTENT(IN) :: isign
        END SUBROUTINE wtstep
    END INTERFACE
    END SUBROUTINE wt1
END INTERFACE
INTERFACE
    SUBROUTINE wtn(a,nn,isign,wtstep)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
    INTEGER(I4B), DIMENSION(:), INTENT(IN) :: nn
    INTEGER(I4B), INTENT(IN) :: isign
    INTERFACE
        SUBROUTINE wtstep(a,isign)
        USE nrtype
        REAL(SP), DIMENSION(:), INTENT(INOUT) :: a
        INTEGER(I4B), INTENT(IN) :: isign
        END SUBROUTINE wtstep
    END INTERFACE
    END SUBROUTINE wtn
END INTERFACE
INTERFACE
    FUNCTION wwghts(n,h,kermom)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    REAL(SP), INTENT(IN) :: h
    REAL(SP), DIMENSION(n) :: wwghts
    INTERFACE
        FUNCTION kermom(y,m)
        USE nrtype
        REAL(DP), INTENT(IN) :: y
        INTEGER(I4B), INTENT(IN) :: m
        REAL(DP), DIMENSION(m) :: kermom
        END FUNCTION kermom
    END INTERFACE
    END FUNCTION wwghts
END INTERFACE
INTERFACE
    SUBROUTINE zbrac(func,x1,x2,succes)
    USE nrtype
    REAL(SP), INTENT(INOUT) :: x1,x2
    LOGICAL(LGT), INTENT(OUT) :: succes
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
```

```
    END INTERFACE
    END SUBROUTINE zbrac
END INTERFACE
INTERFACE
    SUBROUTINE zbrak(func,x1,x2,n,xb1,xb2,nb)
    USE nrtype
    INTEGER(I4B), INTENT(IN) :: n
    INTEGER(I4B), INTENT(OUT) :: nb
    REAL(SP), INTENT(IN) :: x1,x2
    REAL(SP), DIMENSION(:), POINTER :: xb1,xb2
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END SUBROUTINE zbrak
END INTERFACE
INTERFACE
    FUNCTION zbrent(func,x1,x2,tol)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,tol
    REAL(SP) :: zbrent
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION zbrent
END INTERFACE
INTERFACE
    SUBROUTINE zrhqr(a,rtr,rti)
    USE nrtype
    REAL(SP), DIMENSION(:), INTENT(IN) :: a
    REAL(SP), DIMENSION(:), INTENT(OUT) :: rtr,rti
    END SUBROUTINE zrhqr
END INTERFACE
INTERFACE
    FUNCTION zriddr(func,x1,x2,xacc)
    USE nrtype
    REAL(SP), INTENT(IN) :: x1,x2,xacc
    REAL(SP) :: zriddr
    INTERFACE
        FUNCTION func(x)
        USE nrtype
        REAL(SP), INTENT(IN) :: x
        REAL(SP) :: func
        END FUNCTION func
    END INTERFACE
    END FUNCTION zriddr
END INTERFACE
INTERFACE
    SUBROUTINE zroots(a,roots,polish)
    USE nrtype
    COMPLEX(SPC), DIMENSION(:), INTENT(IN) :: a
    COMPLEX(SPC), DIMENSION(:), INTENT(OUT) :: roots
    LOGICAL(LGT), INTENT(IN) :: polish
    END SUBROUTINE zroots
END INTERFACE
END MODULE nr
```