各位同学：

这是我自己的一段代码，大家好好看看我编写代码时注意的格式。重点注意格式和注释。这个程序不长，但是我也会注重这些细节。

龚明/LQCC

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! The purpose of this program is to calculate a random matrix

! with coupling between localized modes and extended modes, using

! | diagonal | !

! | Localized modes | coupling between them !

! H = ! ---------------------------------------------!

! | coupling | Extended modes !

! | | diagonal matrix !

program TwoMatrixCoupling

implicit none

double precision, parameter :: b = 0.43

! N total dimension of the matrix A

! Nk the averaged time of the random potential

! NS is used to calculate the distribution of level spacings

integer, parameter :: N = 4000

integer, parameter :: Nk = 20

integer, parameter :: NS = 500

! N1 and N2 are the dimensions of the subspaces

! N1 + N2 = N, and 0 <= b <= 1.

integer, parameter :: N1 = int(N \* b)

integer, parameter :: N2 = N - N1

double precision :: A(N, N), W(N)

double precision :: A1(N1, N1), W1(N1)

! used for lapack subroutines

integer, parameter :: LWORK = 3 \* N

double precision :: WORK(LWORK)

integer :: INFO

! distribution of eigenvalues

! means: mean level spacing

! ds is the increase spacing

double precision :: dis(1:NS)

double precision :: means, ds, tmp, sumdis

double precision :: sigma1, sigma2

integer :: i, j, k

sigma1 = 0.0

sigma2 = 0.1

dis = 0.0

! check the input data

If( b. gt. 1.0d0 .or. B .lt. 0.0d0) then

write(\*, \*) “ b should in [0, 1], error “

call abort

endif

ds = 2.0d0 /(dble(NS) - 1.0d0)

open(11, file='dis.dat', status='unknown')

do k = 1, Nk

A = 0.0d0

! init the random matrix of A1, which is Hermit.

do i = 1, N1

do j=i, N1

A1(i,j) = (rand()-0.5)

A1(j,i) = A1(i,j)

end do

end do

!DSYEV computes all eigenvalues and, optionally, eigenvectors of a real symmetric matrix A1.

!call dsyev('V', 'U', N1, A1, N1, W1, WORK, LWORK, INFO)

!

!

! INFO

!

! INFO is INTEGER

! = 0: successful exit

! < 0: if INFO = -i, the i-th argument had an illegal value

! > 0: if INFO = i, the algorithm failed to converge; i

! off-diagonal elements of an intermediate tridiagonal

! form did not converge to zero.

!

If(INFO .ne. 0) then

write(\*, \*) “ Failed output of dsyev (A1 matrix), info = “, INFO

write(\*, \*) “ Please check the details from LAPACK “

call abort

endif

do i = 1, N1

!A(i, i) = W1(i) / W1(1)

A(i, i) = 0.0d0

end do

do i = N1+1, N

!A(i, i) = (rand() - 0.5d0)

A(i, i) = 0.0d0

end do

do i = 1, N1

do j = i, N1

A(i, j) = A(i, j) + (rand()-0.5) \* sigma1 / dble(N)

A(j, i) = A(i, j)

end do

end do

! setup the random coupling between the localized modes and extended modes

! with coupling strength about x \* sigma /Sqrt[L],

! where L is the chain length.

do i = 1, N

do j = N1 +1, N

!A(i, j) = A(i, j) + (rand()-0.5) \* sigma2 / dble(N)

A(i, j) = A(i, j) + (rand()-0.5) \* sigma2 / sqrt(dble(N))

A(j, i) = A(i, j)

end do

end do

!DSYEV computes all eigenvalues and, optionally, eigenvectors of a real symmetric matrix A.

call dsyev('V', 'U', N, A, N, W, WORK, LWORK, INFO)

If(INFO .ne. 0) then

write(\*, \*) “ Failed output of dsyev (A matrix), info = “, INFO

write(\*, \*) “ Please check the details from LAPACK “

call abort

endif

! with the eigenvalues, calculate the distribution function

! store the distribution /averaged in dis(i)

means = (W(N) - W(1)) / (N-1.0d0)

write(\*, \*) " # mean separation <s> = ", means, " k = ", k

do i = 1, N-1

tmp = (W(i+1) - W(i))/means

j = int(tmp/ds) + 1

if(j .le. NS .and. j .ge. 1) then

dis(j) = dis(j) + 1.0d0 / (N - 1.0d0)/Nk

endif

end do

end do ! end of k

sumdis = 0.0d0

do i = 1, NS

sumdis = sumdis + dis(i)

write(11, '(2f16.5)') (i-0.5)\*ds, dis(i)/ds

sumdis = sumdis + dis(i)

end do

write(\*, \*) " Sum of distribution = ", sumdis

close(11)

end program