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

! Author info: Ming Gong, 2021/8/12

! 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