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!APPENDIX: CODE for Simple Adsorption-Desorption Dynamic Monte Carlo
!Created by Nikolai (23 May 2001) for D.D. Johnson Lectures
!see K.A.Fichthorn, W.H.Weinberg, J. Chem. Phys. 95, 1090 (1991).
!
      program dMCs
      implicit none
!glsc:
      include '../glsc-3.5/libs/src/glsc_ftn.h' !!!check_the_path!!!

      integer Lx, Ly, LT, N
      parameter( Lx=256, Ly=256, LT= 100000, N=10 )
      integer isite(Lx,Ly)
      real*8  WA, WD, rA, rD
      real*8  r !random_number
      real*8  t,dt,tl,tt !real_time
      !theta = fractional surface covarage: 0<theta<1 !
      real*8  rc,tc,theta,theta0,xc, exptt,expt1
      integer iT
      integer mx,my
      integer i,j,ic,nc
      integer Input, NoTheory
      real*8 pt !length of plot in x-direction = max real time!

! initial default parameters:
      NoTheory=0 !do not draw theoretical curve!
      Input=0    !do not read Input!
      mx=Lx
      my=Ly
      pt=LT
      rA=1.0
      rD=2.0
! Initialize time and fractional coverage
      iT=0    !integer time
      t=0     !real time
      tl=t
      dt=0.001  !real time step
      theta=0 !fractional surface coverage, 0 <= theta <= 1 .

!here read parameters...: mx,my,pt,rA,rD:
      !.......................input.........................!
      Input=1
      NoTheory=1
      if(Input.ne.0) then
        read(5,*) mx,my !dimensions of simulation box
        read(5,*) pt    !max real time
        read(5,*) rA,rD !parameters
      endif
      if(mx>Lx) then
        mx=Lx
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        print*, "Input Error: reducing Lx!"
      endif
      if(my>Ly) then
        my=Ly
        print*, "Input Error: reducing Ly!"
      endif

!parameters mx,my,pt,rA,rD remain unchanged after this line!
      rc=theta
      nc=mx*my
      xc=1/dfloat(nc)
      if(rA > rD) then
        WA=1.0
        WD=rD/rA
      else
        WA=rA/rD
        WD=1.0
      endif
      if(rc<0.or.rc>1) stop "Check: should be 0 < rc < 1 !!!"
      theta0=rA/(rA+rD)

!initialize lattice at random:
      ic=0
      call RANDOM_SEED
      do i=1,mx
       do j=1,my
        call RANDOM_NUMBER(r)
        if(r<rc) then
          isite(i,j)=1
          ic=ic+1
        else
          isite(i,j)=0
        endif
       enddo
      enddo
!  NOTE:
!!!  REMOVED THE THEORY PLOTTING CODE CALLS (SEE REAL SOURCE CODE)
!
!!!run Monte Carlo: Poisson process:
      do while(t<pt)
        !Select a random site (i,j):
        call RANDOM_NUMBER(r)
        i=int(r*mx)+1
        call RANDOM_NUMBER(r)
        j=int(r*my)+1

!Generate a random number 0<r<1:
        call RANDOM_NUMBER(r)
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   !Occupied?
        if(isite(i,j).ne.0) then
        !YES
          if(r.le.WD) then
            !Remove species from lattice
            isite(i,j)=0
            ic=ic-1
       !TIME from Poisson Distr.
            call RANDOM_NUMBER(r)
            dt=-log(r)/(ic*rD+(nc-ic)*rA)
            t=t+dt
          endif
        else
   !NOT Occupied
          if(r.le.WA) then
            !Add species to lattice
            isite(i,j)=1
            ic=ic+1
       !TIME from Poisson Distr.
            call RANDOM_NUMBER(r)
            dt=-log(r)/(ic*rD+(nc-ic)*rA)
            t=t+dt
          endif
        endif
        iT=iT+1
        rc=ic*xc
!
!glsc: !Plot_graphic: theta(t):
        call g_move (tl,theta)
        theta=rc
        tl=t
        call g_plot (tl,theta)

        !print*, t,rc

      enddo !while(t<pt)
!
!glsc:Termination:
      pause
      !call g_sleep (3.0d0)
      call g_term ()
!
      end
!end_of_file!
```