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# This R script is intended to calculate single-particle
 diffusion data for the Lagrangian diffusion
# example in my Astrophysical Hydrodynamics class.
# Set the working directory to be the directory where this
 script and the data resides:
setwd("/Users/RenOnly./Downloads/hstoch2datanew")

#set simulation parameters
eta= 0.02840339^2
teta= 0.1613506
lx=6.2831853
nx=256

#set data-reading parameters
nrec=256
octvec=3  # number of initial frame
octnum=paste("00",octvec,sep="")
stvec=1199 # number of Position file drops per frame
ctvec=c(3:9)  # number of frame to be processed

# loop over time files
for(ijj in ctvec){
ctnum=paste("00",ijj,sep="")

dexs<-c(0:stvec)
for(ii in dexs){
lnum=paste("000",ii,sep="")
if(ii>9) lnum=paste("00",ii,sep="")
if(ii>99)lnum=paste("0",ii,sep="")
if(ii>999)lnum=paste(ii,sep="")

# set the name of the spectra file (based on the )
pnam=paste("lagoutput",ctnum,"/
 pos_sp.",ctnum,".",lnum,sep="")
print(pnam)

# set the binary connection
onam <- file(pnam, "rb")
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# read time into R
dt<-readBin(onam, numeric(), size=4)
print(dt)

# read the x-position array into R
pos1<-readBin(onam, numeric(), n=nrec, size=4)

# read the y-position array into R
pos2<-readBin(onam, numeric(), n=nrec, size=4)

# read the z-position array into R
pos3<-readBin(onam, numeric(), n=nrec, size=4)


# close this binary connection before opening the next
close(onam)
unlink(onam)

## scale positions from grid units to physical units
pos1<-(pos1)*lx/nx
pos2<-(pos2)*lx/nx
pos3<-(pos3)*lx/nx

# calculate single particle diffusion in each direction:
# a1 (x direction), a2 (y direction), a3 (z direction)
a1=pos1[9]
a2=pos2[9]
a3=pos3[9]

# write diffusion data into "data" folder (you have to
 create the folder)
#wnam=paste("datapos2/time.dat",sep="")
#write(dt,file=wnam, append=TRUE, sep = "\t")

wnam=paste("datapos2/xposition2.dat",sep="")
write(a1,file=wnam, append=TRUE, sep = "\t")
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wnam=paste("datapos2/yposition2.dat",sep="")
write(a2,file=wnam, append=TRUE, sep = "\t")

wnam=paste("datapos2/zposition2.dat",sep="")
write(a3,file=wnam, append=TRUE, sep = "\t")

#wnam=paste("datapos/rposition.dat",sep="")
#write(a4,file=wnam, append=TRUE, sep = "\t")

print("done");print(ijj);print(ii)

} # ii time loop
} # ijj time loop

print("Successful finish.")

# Normalization by the Kinetic energy and length scale
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