slipslide Group

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December 21, 2023

Contents

1

slipslide Overview

slipslide is a J script that estimates how far slowly moving (< 20 m/sec) objects slide on a a perfectly flat frictionless plane when acted upon by stationary sea level air resistance alone.

slipslide was written to explore side topics that came up during the composition of a story.

slipslide Interface

```
lyinghuman    [4] slide parameters for a human lying down facing wind
shootermarble [5] slide parameters for 19mm glass shooter marble
slipslide0    [6] estimate slide of object on frictionless plane
```

slipslide Source Code

```
NB.*slipslide  s--  estimate   slide  distance  of   objects   on
NB. frictionless plane.
NB.
NB. Estimate how  far  objects  will slide  on  a  perfectly flat
NB. frictionless plane  when acted  upon  only  by stationary air
NB. resistance.
NB.
NB. verbatim: interface word(s):
NB. -----------------------------------------------------------
NB.  lyinghuman    - slide parameters for a human lying down facing wind
NB.  shootermarble - slide parameters for 19mm glass shooter marble
NB.  slipslide0    - estimate slide of object on frictionless plane
NB.
NB. created: 2023Dec21
NB. -------------------------------------------------------------------


coclass 'slipslide'



NB.*end-header

NB. interface words (IFACEWORDSslipslide) group
IFACEWORDSslipslide=: <;._1 ' lyinghuman shootermarble slipslide0'

NB. root words (ROOTWORDSslipslide) group
ROOTWORDSslipslide=: <;._1 ' IFACEWORDSslipslide ROOTWORDSslipslide VMDslipslide lyinghuman shootermarble s
```

```
>..>lipslide0'
```

```
NB. version, make count and date
VMDslipslide=: '0.5.0';4;'21 Dec 2023 12:59:56'


lyinghuman=: 3 : 0

NB.*lyinghuman v-- slide parameters for a human lying down facing wind.
NB.
NB. monad:  fl =. lyinghuman faV
NB.
NB.    lyinghuman 8.8  NB. roll down frictionless 4m

NB.   air density (kg/m^3)
NB. https://www.wolframalpha.com/input?i=air+density+at+sea+level+in+kilograms+per+cubic+meter
rho=. 1.226


NB. human mass (kg)
hm=. 75


NB. drag coefficient around same as car
NB. https://physics.info/drag/
c=. 0.35


NB. head forward cross section area (m^2)
ha=. 0.2
```

```
NB. air, drag, area, mass, velocity
rho,c,ha,hm,y
)

shootermarble=: 3 : 0

NB.*shootermarble v-- slide parameters for 19mm glass shooter marble.
NB.
NB. monad:  fl =. shootermarble faV
NB.
NB.    shootermarble 1     NB. 1 m/sec
NB.    shootermarble 8.8   NB. roll down frictionless 4m

NB.   air density (kg/m^3)
NB. https://www.wolframalpha.com/input?i=air+density+at+sea+level+in+kilograms+per+cubic+meter
rho=. 1.226

NB. glass density (kg/m^3)
NB. https://www.wolframalpha.com/input?i=2520+kilograms+per+cubic+meter&assumption=%22ClashPrefs%22+-%3E+%
>..>22%22
gd=. 2520

NB. radius shooter marble (m)
NB. https://www.moonmarble.com/t2-marbleinfo.aspx
rm=. 0.0095

NB. mass of shooter marble (kg)
```

```
mm=. gd * (4%3) * 1p1 * rm^3


NB. drag coefficient ideal sphere
NB. https://physics.info/drag/
c=. 0.5


NB. area shooter marble (m^2)
ma=. 1p1 * rm^2


NB. air, sphere drag, area marble, mass marble, velocity
rho,c,ma,mm,y
)



slipslide0=: 3 : 0

NB.*slipslide0  v-- estimate  slide  of  object  on  frictionless
NB. plane.
NB.
NB. This verb estimates how far a slowly  moving <20 m/sec object
NB. will slide  on a perfectly frictionless flat  plane when only
NB. acted upon by air resistance.
NB.
NB. verbatim:
NB.
NB. The basic formula is: R = ½ CAv^2  https://physics.info/drag/
NB.
NB. R   drag force (Newtons) (kg*m/sec^2)
```

```
NB.      air density (kg/m^3)
NB. C    coefficient of drag
NB.      constant determined by experiment
NB. A    projected area (m^2)
NB. v    velocity (m/sec)
NB.
NB. monad:  flSva =. slipslide fl
NB.
NB.    NB. air, sphere drag, area marble, mass marble, velocity
NB.    slip=. shootermarble 1
NB.    slipslide0 shootermarble 1
NB.
NB. dyad:  flSva =. fldTCnt slipslide fl
NB.
NB.    NB. a 1 m/sec marble is still slowly moving
NB.    NB. after 2 hours and has rolled around 1/2 km
NB.    (0.001,1000 * 3600 * 2) slipslide0 slip
NB.
NB.    NB. spreadsheet cross check
NB.    0.001 19970 slipslide0 slip
NB.
NB.    NB. a human is still sliding after two hours
NB.    (0.001,1000 * 3600 * 2) slipslide0 lyinghuman 8.8

0.001 1000 slipslide0 y
:
```

```
'rho C A M vn'=. y [ 'dT cnt'=. x

NB. initial drag force and acceleration
an=. rn % M [ rn=. 0.5 * rho * C * A * vn^2

S=.  0  NB. total distance

for_step. i. cnt do.
  dS=. dT * vn        NB. step distance
  vn=. vn - an * dT  NB. new velocity (decreasing)

  NB. new drag and acceleration
  an=. rn % M [ rn=. 0.5 * rho * C * A * vn^2

  S=. S + dS
end.

NB. distance, end velocity, acceleration, step count
S,vn,an,>:cnt
)

NB.POST_slipslide post processor.

smoutput IFACE=:  (0 : 0)
NB. (slipslide) interface word(s): 20231221j125956
NB. -------------------------
NB. lyinghuman     NB. slide parameters for a human lying down facing wind
NB. shootermarble  NB. slide parameters for 19mm glass shooter marble
```

```
NB. slipslide0    NB. estimate slide of object on frictionless plane
)

cocurrent 'base'
coinsert  'slipslide'
```

Index