

slipslide Group

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<https://github.com/bakerjd99/jacks/blob/master/slipslide/slipslide.ijs>

SHA-256: 2f8300861455f88675586dbf3e074c8b213631b54de806691d2140e4bf4c41d4

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slipslide Overview

`slipslide` is a J script that estimates how far slowly moving (< 20 m/sec) objects slide on 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

| | | |
|-----------------------------|-----|--|
| <code>lyinghuman</code> | [4] | <i>slide parameters for a human lying down facing wind</i> |
| <code>shooter-marble</code> | [5] | <i>slide parameters for 19mm glass shooter marble</i> |
| <code>slipslide0</code> | [6] | <i>estimate slide of object on frictionless plane</i> |

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';01;'21 Dec 2023 13:10:51'
```

```
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/m3)
```

```
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 (m2)
```

```
ha=. 0.2
```

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

```
shooter_marble=: 3 : 0
```

```
NB.*shooter_marble v-- slide parameters for 19mm glass shooter marble.
```

```
NB.
```

```
NB. monad: fl =. shooter_marble faV
```

```
NB.
```

```
NB. shooter_marble 1 NB. 1 m/sec
```

```
NB. shooter_marble 8.8 NB. roll down frictionless 4m
```

```
NB. air density (kg/m3)
```

```
NB. https://www.wolframalpha.com/input?i=air+density+at+sea+level+in+kilograms+per+cubic+meter
```

```
rho=. 1.226
```

```
NB. glass density (kg/m3)
```

```
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:  $R = \frac{1}{2} C A v^2$  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): 20231221j131051
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'
```

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