

Frictional force or friction

Every day objects have rough and impure surfaces.

Two objects together \Rightarrow Stuff sticks!

How well do they stick? "bonds"

The more force, the better.

(Note: clean surfaces in labs do not follow this rule \rightarrow they stick ("bond") really well without much force! Say a silicon lab)

Static friction : $f_s \leq \mu_s n$
 $\uparrow \quad \uparrow$ normal force
static friction coefficient

Kinetic friction : $f_k = \mu_k n$

$\mu_k < \mu_s$ (moving surfaces do not relatively stick as well)

Meaning of $f_s \leq \mu_s n$

If an applied force \vec{F}_a is less than $\mu_s n$, the object does not move.

If $F_a \leq \mu_s n \Rightarrow f_s = F_a$

If $F_a > \mu_s n$, then the object moves and then f_k applies.

What's friction good for? almost
(Consider ice surface for \checkmark no-friction case)

~~Good for~~ walking, braking ~~easy~~ for us!!
Makes easy

Drag force

Molecules in air or liquid ~~resist~~ resist moving objects.

$$\vec{F}_D = -\beta \vec{v} \quad (\text{low } v \text{ only})$$

$$F_D = K v^2 \quad (\text{for high } v)$$

How parachutes work.

→ terminal velocity!
(eventually no acceleration ... thank god!)