

Section 5

3/4/14

① - "The Professor"
- Are bugs strong?

② HW

① Watch Video!

Mom eqn. w/ fric

$$\frac{\partial u}{\partial t} - f v = \frac{\partial}{\partial z} \left(A_v \frac{\partial u}{\partial z} \right)$$

Scale $(u, v) \rightarrow \sigma(\hat{u}, \hat{v})$

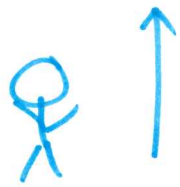
$t \rightarrow T \hat{t} \quad z \rightarrow H \hat{z}$

$$\rightarrow \frac{\sigma}{T} \frac{\partial \hat{u}}{\partial \hat{t}} - f \sigma \hat{v} = \frac{A_v \sigma}{H^2} \frac{\partial^2 \hat{u}}{(\partial \hat{z})^2}$$

$$\text{So } \frac{\text{Cor}}{\text{Fric}} \sim \frac{f \sigma H^2}{A_v \sigma} \sim \frac{f H^2}{A_v}$$

For a shallow disc, H being small dominates!!

Bugs



How high can we jump?

Relevant

$$K.E = \frac{1}{2}mv^2$$

$$P.E = mgh \Rightarrow h = \frac{v^2}{2g}$$

To accelerate, need Power

$$(\text{Work/second}) = \frac{\text{Force} \cdot \text{Distance}}{\text{Time}}$$

$$P = \overbrace{m \cdot g}^{\text{Force}} \cdot \left(\frac{m}{T}\right) = mgv$$

↑ velocity

Suppose P/m (power in a unit mass of fles)

$$= \text{const.} \equiv \rho$$

$$\text{then } \rho = gv \rightarrow h = \frac{(\rho/g)^2}{2g}$$

$$= \frac{\rho^2}{2g^3} \quad !!$$

- constant. Bugs suck.