Newtonian fluids

Engineering Fluid Mechanics

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VISCOSITY INCREASING

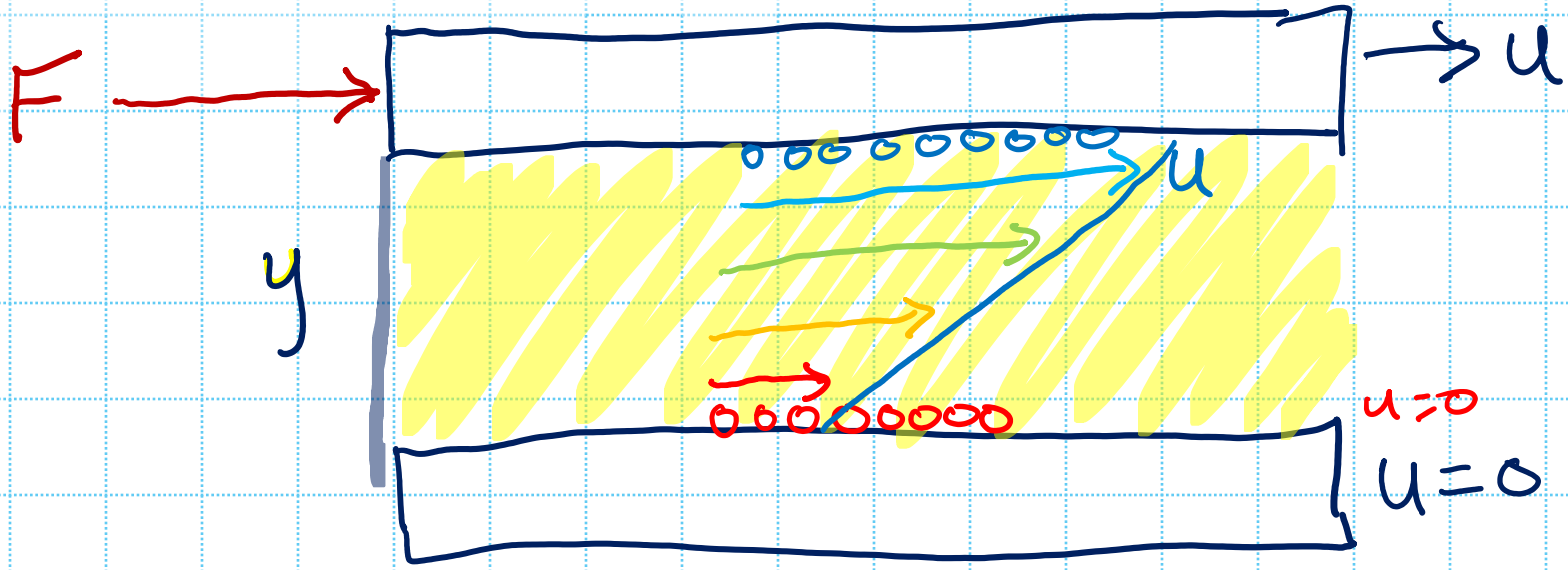
FORCE INCREASING

air

water

honey

Viscosity



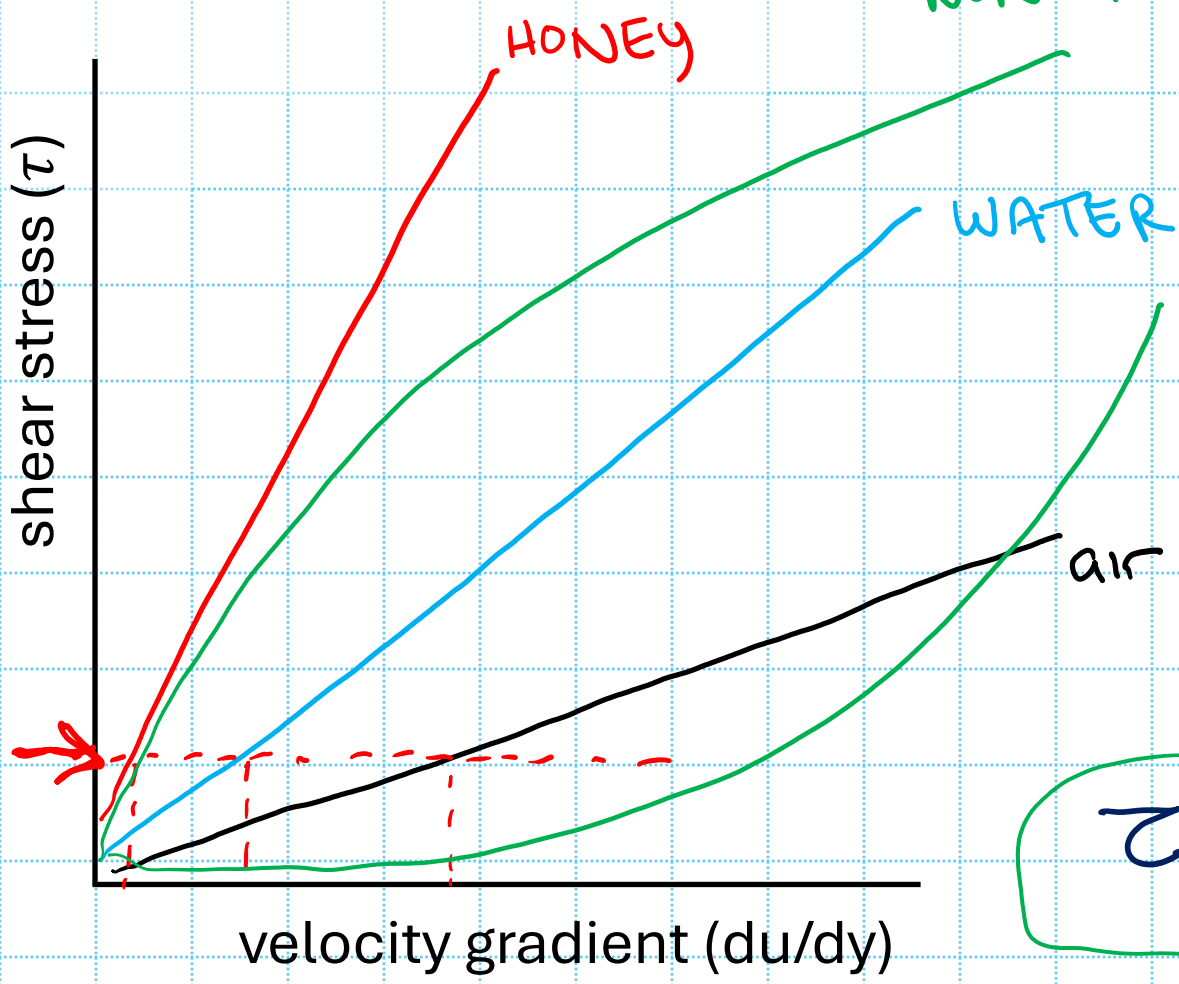
VELOCITY GRADIENT $= \frac{du}{dy}$

F/A = STRESS = SHEAR STRESS

τ

$\tau \neq \frac{du}{dy}$

No-slip condition and velocity distribution



NON-NEWTONIAN FLUIDS

NEWTONIAN FLUID – VELOCITY GRADIENT IS LINEARLY RELATED TO SHEAR

$$\tau = \mu \frac{du}{dy}$$

↑ FLUID VISCOSITY

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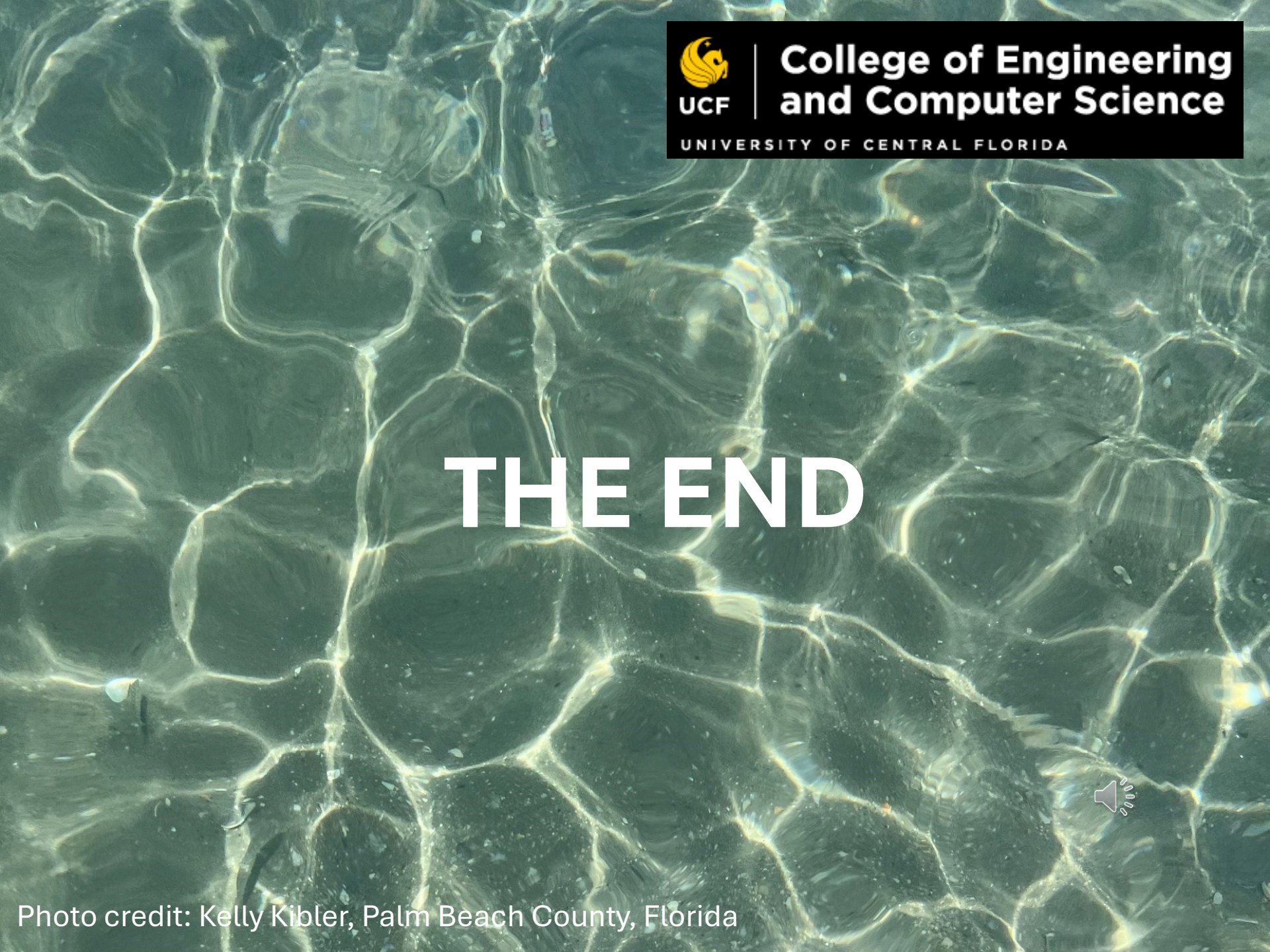

Photo credit: Kelly Kibler, Palm Beach County, Florida