

1.1 Fluid Mechanics: read
 liquid, gas = fluid

1.2 Units: read

1.3 Solids, liquids, gases
 solid: fixed shape under



liquid, fluid: keeps deforming



gas fills container.

Mixtures exist: viscoelastic

1.4 Continuum hypothesis

"Real" life (more precise) molecules

Continuum hypothesis: molecules are "smeared out" into a continuous mass distribution

E.g. density:

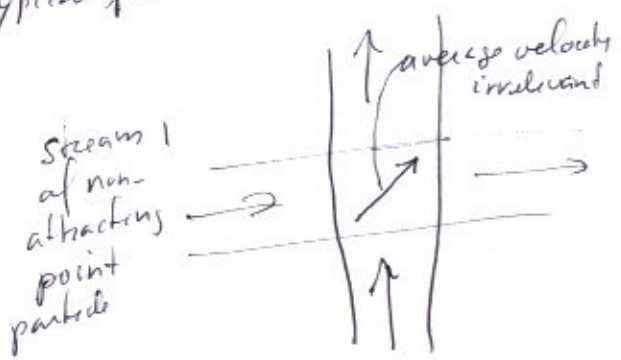
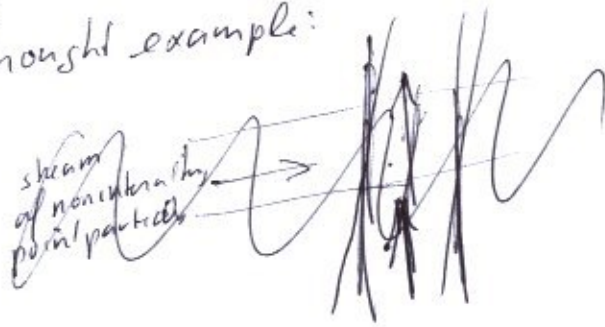


assuming homogeneous mass distribution
 half the volume \rightarrow half the mass

Key number: Knudsen number: =

$$\frac{\text{free path length}}{\text{typical flow length scale}}$$

Thought example:

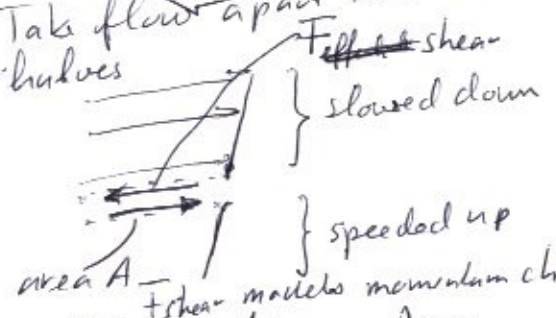


1.5 Molecular transport



molecular motion in a gas
 causes molecules with higher average v_x to move to lower average v_x and vice-versa

Continuum ~~modeling~~ modeling:
 Takes flow ~~apart~~ ^{mentally} apart into two halves



$F_{\text{shear}} = \tau A = \eta \frac{dv_x}{dy} A$

τ shear models momentum change