

### Linear momentum - mass system

Reynold's Theorem: the bridge. Mass system to control volume. Lagrang to Eulerian	if $t=t$ : $B_{sys}=B_{cv}$ , $CV=Sys$ , occupy the same space
extensive quantities (B): depend on the size of the region. If $B = m$ then $b = 1$ If $B = \square$ $\square_v$ then $b = v$	if $t=t + \Delta t$ , $B_{sys} \neq B_{cv}$ , $CV \neq Sys$ , we use Reynolds here.
intensive quantities (b): independent of the size	Flow rate: $Q=Av$ , if $p$ is constant $\rightarrow$ mass flow rate

### Reynolds formula

final Reynold's transport theorem:

$$\frac{d}{dt} B_{sys} = \frac{d}{dt} \int_{CV} \rho b dV + \int_{CS} \rho b (\vec{V} \cdot \vec{n}) dA$$

change in quantity of interest with the CV
flow in and out of CV of the quantity of interest

when a moving CV we have  $w$  as the relative velocity.  $w = v - v_{cs1}$

### Forces acting on fluids

$$\sum \vec{F}_{cv} = \sum \vec{F}_{body} + \sum \vec{F}_{surface}$$

$\sum \vec{F}_{body} = \int_{CV} \rho \vec{f} dV$  : Act on each element with the body/fluid, applied to the whole control volume  
 $\sum \vec{F}_{surface} = \int_{CS} \vec{t} dA$  : Act on each element on the control surface (stress comes from the balance of linear momentum)

$dP/dt = \sum F_{sys} = \sum F_{cv}$ , where  
 $P = mv$ : momentum

### How to set up a cv problem

whats happening, whats gonna cause. What are we trying to solve.

To draw CV: we think of where you bisects-cut into 2 parts

In volume: be within the boundaries of CV. Area integral: must bisect the boundary-s/surface of CV

Accummulation? In which integral are we looking. Does the quality act on the surface. Align the flow with dirt vector,

### mass vs linear momentum

Balance of Mass:	Balance of Linear
Finding flow rates, the relationship velocities and areas. Scalar. (-/+)	Momentum: Finding relatshs btnw flow properties and forces. Vector. (-/+)
from scalar product	from scalar product or direct of vector quantities

B of mass in B of linear momentum problems to find unknown.



By **Pamsj10**  
[cheatography.com/pamsj10/](https://cheatography.com/pamsj10/)

Not published yet.  
Last updated 5th November, 2023.  
Page 2 of 2.

Sponsored by **ApolloPad.com**  
Everyone has a novel in them. Finish Yours!  
<https://apollopad.com>