

Microscopic Fluid Mechanics

$$\frac{\partial \rho}{\partial t} + \frac{\partial}{\partial x} (\rho u_x) + \frac{\partial}{\partial y} (\rho u_y) + \frac{\partial}{\partial z} (\rho u_z) = 0$$

general Continuity equation in Rectangular Cartesian Coordinate

* for incompressible fluid & Newtonian fluid

Navier - Stokes equations

to solve a problem

* Make a reasonable simplifying assumptions

* write down the equations of motion $\left\{ \begin{array}{l} 1 \text{ Continuity} \\ 3 \text{ momentum balances} \end{array} \right.$

* Integrate the simplified equations in order to obtain expressions for the velocity or pressure

* Invoke the B.C's

* Derive if needed an expression for the shear-stress profile by differentiating the velocity profile.