

Monday, May 18 2020

- We did project updates, and then started delving into Navier Stokes Equation.
- We started by force balance inside a cube, and used Newton's law to balance the total force component due to pressure terms, viscous terms, and a source term inside a volume with the product of density and acceleration.
- We then covered constitutive relationships to relate stresses to strain rates. In our example, we ended up forming equations where stress in a direction is related to deformation by velocity by the sum of a) velocity gradient in that direction (vector quantity) and b) the divergence of velocity vectors (scalar).
- Substituting the expression from the constitutive relationship into the force balance equation yields the Navier-Stokes Equation.
- We realised that the equations got ugly pretty soon !
- To factor in the pressure term in the Navier-Stokes Equation, Ed introduced the concept of using mass conservation involving density and velocity.
- We then discussed the concept of staggered grids which help in eliminating the problem similar values on velocity and pressure on alternating edges, where the default mesh will just evaluate to 0 gradient !
- Overview of SIMPLE algorithm.