Writing A Fluid Solver From First Principles-Outline

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1 Components of a Numerical Solution Method

1. Mathematical Model
   (a) First of all, what are you modeling?
        i. Incompressible fluid flow in a channel
        ii. What are the physical implications of the fluid adjectives used here?
   (b) Why are you modeling this?
   (c) How are you modeling it, what set of equations are you using?
   (d) Why are you modeling it this way?
2. Discretization Method
   (a) I am using finite differences to discretize the equations
   (b) What does it mean to "discretize"?
   (c) How do finite differences discretize the equations in question?
   (d) How well do finite differences match the physics in question?
3. Coordinate and Basis Vector System
   (a) Working in Cartesian Coordinates
   (b) Why are you working in cartesian coordinates?
   (c) What would change if using different coordinate system?
   (d) "Basis in which vectors and tensors will be defined"?
4. Numerical Grid
5. Finite Approximations
6. Solution Method
7. Convergence Criteria