

Introduction to Fluids

3.044 March 7, 2005

Mechanics:

- Review session tonight 7 PM
- Test 1 Wednesday

Today's lecture:

- Test questions
- Fluids in Materials Processing

Test 1 Wednesday 3/9

- Study: memorize equations on the list, do practice problems in the assignments section
- Take the test, will include equation sheet
- If you need an equation not on memorization list, not on equation sheet, raise your hand and I'll put it on the board
- Indicate on answer book which recitation you'll attend
- Between Wednesday and Thurs/Fri: study exam, preferably with others!
- Re-do erroneous parts during recitation

Fluids in Materials Processing

General categories of fluid flows:

- Confined flows (channels, tubes)
- Free flows (jets, wakes, boundary layers)

- Laminar flow (slow, simple)
- Turbulent flow (fast, "chaotic")

- Incompressible flow (most liquids)
- Compressible flow (gases at $\text{Mach} > 0.4$)

Roles of Fluids in Processes

- Bring reactants, heat to/from solids
- Mixing for homogeneity or to promote reactions
- Continuous flow reactors
- Annoyance flows: natural convection, etc.

Calculation outcomes:

- Flow rate
- Drag force
- Heat and mass transfer coefficients (not much in 3.044)