

cyron.completo  
@colorado.edu

Today:

- Admin
- Finish First Assignments
- Start Overview: Choices in imaging

Name Table Tents

Put signed Use Agreement, Syllabus Agreement, on piles up front.

WP logins: success?

ITLL orientations: For after-hours access and computer login, attend a 1/2 hr tour. Find out what resources are here, agree to not spill drinks on the keyboards:

[https://itll.colorado.edu/about\\_us/building\\_tours/access\\_orientation\\_tour/](https://itll.colorado.edu/about_us/building_tours/access_orientation_tour/)

You may take an orientation tour Monday-Friday at 5:15pm, or 1:15pm on Sundays. The tour starts in front of the ITLL LaunchPoint on the top floor. Don't forget to bring your BuffCard.

Lecture notes will be posted on the Flow Vis site. Feel free to nag me.

First Assignments

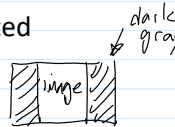
<http://flowvis.org/media/course/initialassignments.pdf>

Have you read this? Questions?

Clouds: There will be two Cloud assignments, with the first due Monday March 5, and the second image due April 9. This is to give plenty of opportunity to observe a variety of atmospheric conditions. Images made before Jan 12 2018 will not be acceptable for the Cloud First assignment, and images made before March 5 will not be acceptable for the Cloud Second assignment.

Keep notes on time, date, your location and orientation (facing north etc).

All assignments: Make your image uploaded to flowvis.org no larger than 1300px wide, no more than 900 tall. Best to pad width of portrait oriented images.



## Overview 1: Topics will be presented iteratively.

Previsualization: Have a goal, think about what you want it to look like.

Make CHOICES:

1. Flow phenomenon: Water boiling? Faucet dripping?
2. Visualization technique: Add dye? See light distorted by air/water surface?
3. Lighting (source of worst image problems)  
Volunteer(s) needed to shop for lighting equipment. We have a \$1000 budget.
4. Image acquisition: Still? Video? Stereo? Time lapse? High speed?
5. Post processing, final output. Edit, at least crop the image and set contrast.

Grace  
Summer  
ABB IE

### 1. Flow phenomenon: *Why does it look like that?*

What are the forces? = a framework for interpretation of the image  
Minute paper. In groups (3 or so) list all the forces that can act on a fluid.  
Write on a scrap of paper to hand in.

Gravity  
Pressure

Normal force (pressure)  
 Buoyancy  
 Intermolecular forces  
 Viscous (shear)  
 Drag  
 Van der Waals (intermolecular)  
 Friction  
 Surface tension (Marangoni)  
 Electromagnetic  
 Covalent forces  
 Capillary forces  
 Temperature differential/gradient

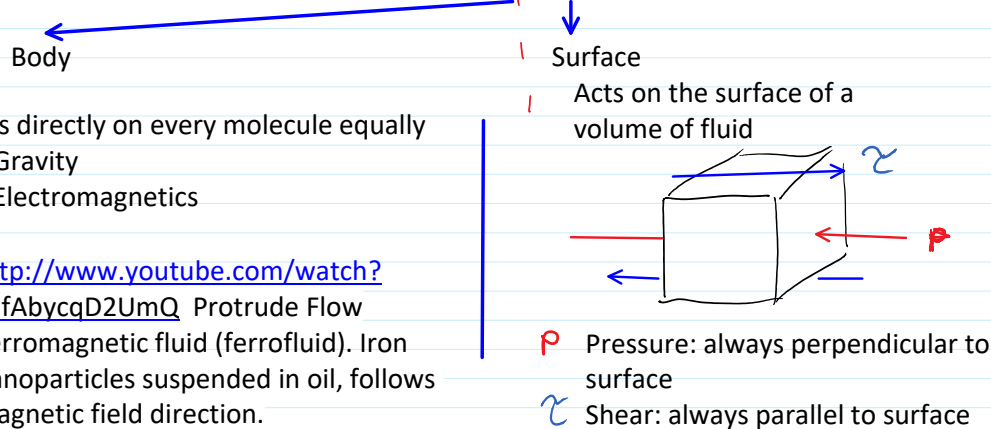
Minute paper results:

Viscous	Air resistance (drag)	Composition of fluids
Shear	Cohesion	Densities of fluids
Gravitational	Adhesion (capillary action)	Chemical reactions
Buoyancy	Normal force	Impact
Electromagnetic	Stress	Wind
Electrostatic	Strain	Mass
Inertial	Thermodynamic	Acceleration
Centripetal/centrifugal	Heat	Temperature
Pressure	Convection	Phase change
Body forces: gravity, buoyancy, EM	Osmosis	Strong, weak nuclear forces
Viscosity, shear, friction	Solar radiation	Cavitation
Thermal diffusivity		Vortex structures
Interaction with other fluids		vortex stretching
Surface tension		concentration gradient
Intermolecular		

Got to here  
 Fri 1/19/18

Good, inclusive list. Not all are forces, but all can 'drive' a flow via a set of physics or mechanism. Heat, for example.

All forces can be categorized like this: 2 types of forces



<http://www.youtube.com/watch?v=fAbycqD2UmQ> Protrude Flow Ferromagnetic fluid (ferrofluid). Iron nanoparticles suspended in oil, follows magnetic field direction.

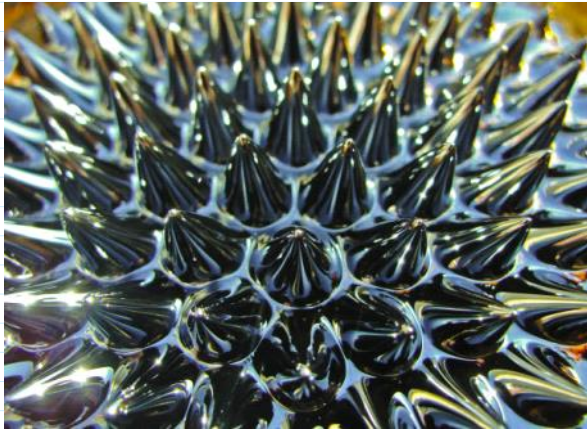
We have a couple of quarts available. Nontoxic, but very messy. "Normal field instability"

[http://www.flowvis.org/OldGalleries/2010/Team-2/FV\\_popup1-16.htm](http://www.flowvis.org/OldGalleries/2010/Team-2/FV_popup1-16.htm)



Any surface force can be decomposed into a shear plus pressure

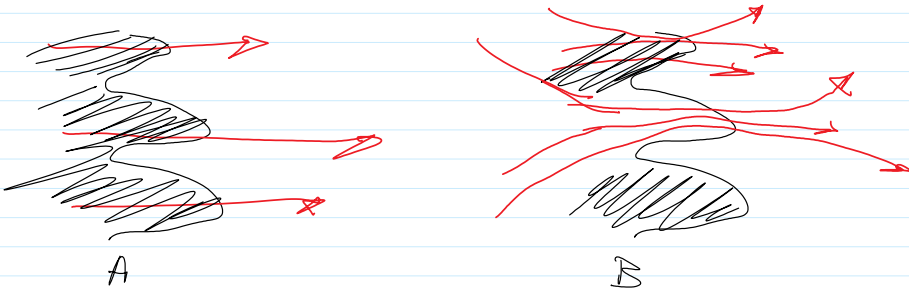
Note: these are actually STRESSES = Force acting on an area.



Force acting on an area.

Daniel Notary, Nathan Weigle, Allison Hamrick  
Team-2 Spring 2010  
Ferrofluid on a magnetized bolt.

<https://vimeo.com/album/1871269/video/55075720>



Yes, ferrofluid is available for checkout for you to play with.