

Math 519: January 2015

Lectures: Mon, Wed, Fri, 15.00-16.00 in BUCH B303

Assessment:

Exercises/reading: This will be assigned throughout the course. On Mondays we will stay until 16.30 roughly to discuss assigned problems & reading (25%)

Seminar: A number of lectures will be given by the participants and will consist of reading research papers and discussing/presenting a summary of the methodology and results, followed by group discussion. (25%)

Project report: participants will complete a short project that will consist of applying some of the techniques learned to a non-trivial visco-plastic flow of their choice (by agreement with the instructor). (50%)

Schedule:

Date	Topic	Speaker
07/01	Viscosity & non-Newtonian fluids	Frigaard
09/01	Viscoelastic fluids	Frigaard
12/01	Thixotropy/structure in fluids:	Frigaard
14/01	Visco-plastic fluid origins:	Frigaard
16/01	Flow in a pipe:	Frigaard
19/01	Start-up flows: channels & pipes	Goyal/Datt
21/01	Unsteady 1D flows: Stokes/Rayleigh problems	Rahmani/Liu
23/01	Oscillating shear flows & applications	Jeon/Peng
26/01	Lubrication paradox:	Frigaard
28/01	Narrow eccentric annulus:	Zare/Sarmadi
30/01	Thin film:	Etrati/Yan
02/02	Wavy-walled channel:	Nasouri (Rostai)
04/02	Stretching flows:	Maleki/Chaparian
06/02	Stokes flows: maximization/minimization principles 1	Frigaard
09/02	Family day – vacation	
11/02	Stokes flows: maximization/minimization principles 2	Frigaard
13/02	Variational inequalities, existence & uniqueness	Frigaard
14/02- 22/02	Spring break	
23/02	Computing yield stress fluid flows: regularization vs augmented Lagrangian	Frigaard
25/02	Computing yield stress fluid flows: steady flow example	Frigaard
27/02	Computing yield stress fluid flows: transient flow example	Frigaard
02/03	Continuity & monotonicity results	Frigaard

04/03	Zero flow and the critical yield stress	Frigaard
06/03	Calculating the critical yield stress:	Frigaard
09/03	Bubbles, drops, particles in visco-plastic fluids 1	Frigaard
11/03	Bubbles, drops, particles in visco-plastic fluids 2	Frigaard
13/03	Finite time decay and finite stopping distances	Frigaard
16/03	Energy stability of stationary flows	Frigaard
18/03	Linear stability	Frigaard
20/03	Other stability questions and observations	Frigaard
	Project work 21/03 – 15/04	
08/04	Hele-Shaw flows & Pressure gradient limiting flows:	Frigaard
10/04	Transform methods:	Frigaard

Project reports (< 20 pages) due 15th April

There is no course text.