Yield Stress Fluids in Immiscible Two Phase Flow

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PoreLab
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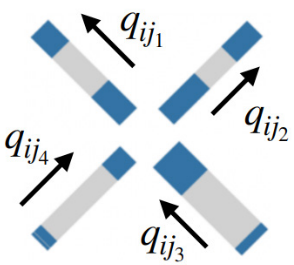
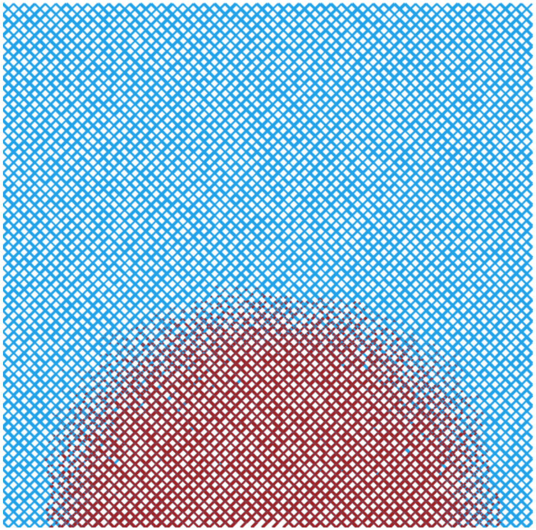
Porøse medier

$$q = \frac{\kappa}{\mu}\frac{\Delta P}{L}$$

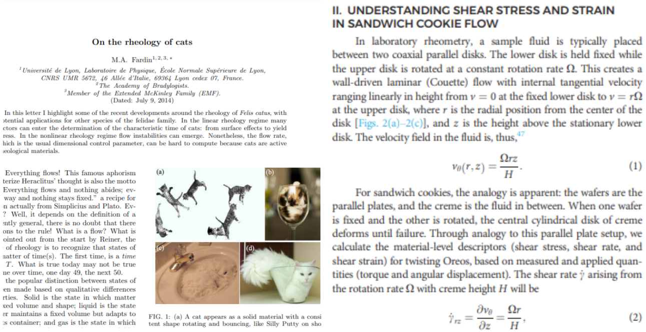
- Darcys lov – utfordringer med porøse medier
- Forventer 3 ulike fenomener for Newtonsk væske – kapillære og viskøse krefter dominerer
- Pore-Nettverksmodell





Ikkenewtonske væsker

- Bingham-væsker: Majones, oreokrem og... katter?
- System med koblede, ikkelineære ligninger – løses med ALM
- Kan utvides til indeks-fluider



On the rheology of cats

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In this letter I highlight some of the recent developments around the rheology of *Felis catus*, with ›tential applications for other species of the felidae family. In the linear rheology regime many ctors can enter the determination of the characteristic time of cats: from surface effects to yield ress. In the nonlinear rheology regime flow instabilities can emerge. Nonetheless, the flow rate, hich is the usual dimensional control parameter, can be hard to compute because cats are active ıeological materials.

Everything flows! This famous aphorism terize Heraclitus' thought is also the motto Everything flows and nothing abides; ev- way and nothing stays fixed." a recipe for n actually from Simplicius and Plato. Ev- ? Well, it depends on the definition of a ently general, there is no doubt that there ons to the rule! What is a flow? What is ointed out from the start by Reiner, the of rheology is to recognize that states of natter of time(s). The first time, is a *time* T. What is true today may not be true ne over time, one day 49, the next 50. the popular distinction between states of en made based on qualitative differences rties. Solid is the state in which matter xed volume and shape; liquid is the state er maintains a fixed volume but adapts to s container; and gas is the state in which

FIG. 1: (a) A cat appears as a solid material with a consi tent shape rotating and bouncing, like Silly Putty on sho

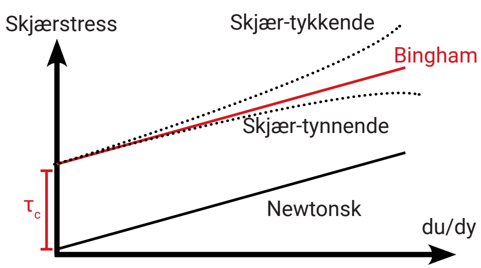
II. UNDERSTANDING SHEAR STRESS AND STRAIN IN SANDWICH COOKIE FLOW

In laboratory rheometry, a sample fluid is typically placed between two coaxial parallel disks. The lower disk is held fixed while the upper disk is rotated at a constant rotation rate Ω. This creates a wall-driven laminar (Couette) flow with internal tangential velocity ranging linearly in height from $v = 0$ at the fixed lower disk to $v = r\Omega$ at the upper disk, where r is the radial position from the center of the disk [Figs. 2(a)–2(c)], and z is the height above the stationary lower disk. The velocity field in the fluid is, thus,[47]

$$v_\theta(r,z) = \frac{\Omega r z}{H}. \quad (1)$$

For sandwich cookies, the analogy is apparent: the wafers are the parallel plates, and the creme is the fluid in between. When one wafer is fixed and the other is rotated, the central cylindrical disk of creme deforms until failure. Through analogy to this parallel plate setup, we calculate the material-level descriptors (shear stress, shear rate, and shear strain) for twisting Oreos, based on measured and applied quantities (torque and angular displacement). The shear rate $\dot\gamma$ arising from the rotation rate Ω with creme height H will be

$$\dot\gamma_{rz} = \frac{\partial v_\theta}{\partial z} = \frac{\Omega r}{H}, \quad (2)$$



Strømning i ett rør

$$q_{ij} = \begin{cases} \sigma_{ij}\left(\Delta p_{ij} + p_\gamma - \tau_{ij}\right) & \text{if } |\Delta p_{ij} + p_\gamma| > \tau_{ij} \\ 0 & \text{if } |\Delta p_{ij} + p_\gamma| \le \tau_{ij} \end{cases}$$

Resultater og videre arbeid