



# Phase transition of rheological property

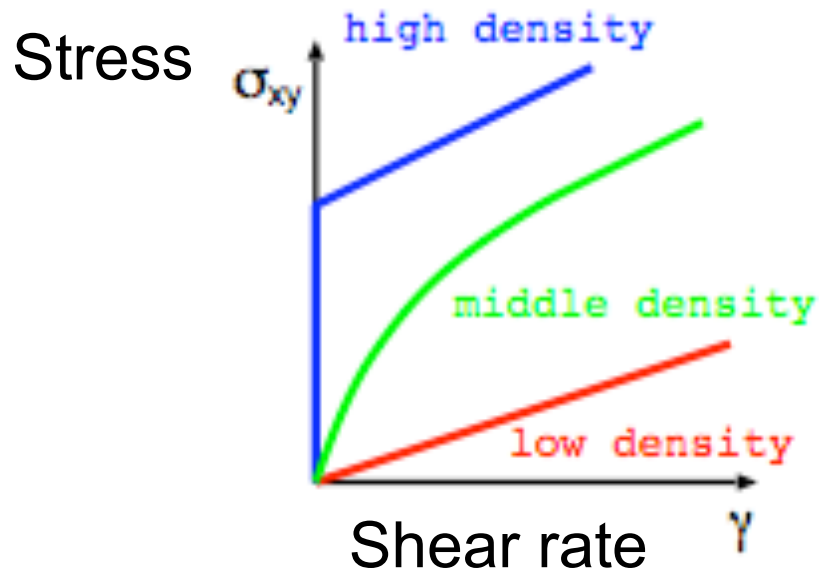
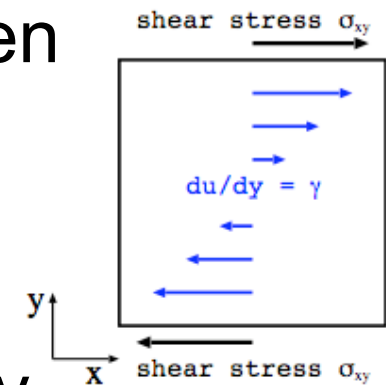
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M. Otsuki and S. Sasa, J. Stat. Mech., L10004 (2007)



# Rheological property of pastes

- Rheological property : Relation between stress and shear rate
- Pastes : mixture of water and powder (clay etc.)
- Phase transition of rheological property



Low density



High density



Paste on slope

# Theory for the non-equilibrium phase transition

- Microscopic model
- Order parameter equation derived by mean field approximation

$$a(\rho - \rho_c)\sigma + b\sigma^3 - c\gamma = 0$$

$\sigma$  : shear stress       $\gamma$  : shear rate       $\rho$  : density  
 $\rho_c$ : critical density      a, b, c: constants

- Stress is the order parameter
- Similar to critical phenomena of magnetization

