Consultant's report

Michel Louge, IFPRI AGM
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Powder Flow portfolio

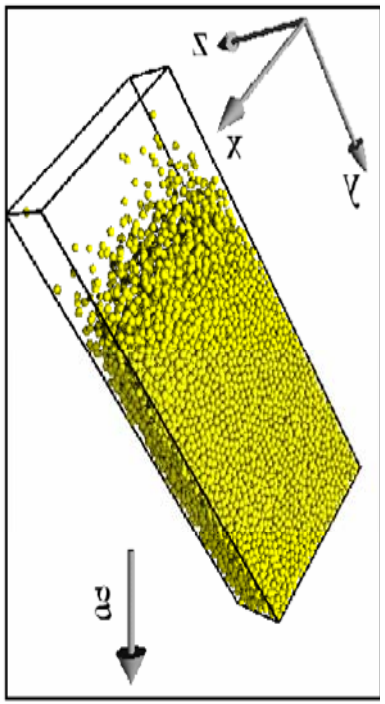
- Joe McCarthy (segregation)
- Colin Hare (yield)
- Charlie Wu (die filling)
- Karen Daniels (non-local rheology)

Powder Flow workshop

- 8 + 2 academic experts
- 38 industrialists, 21 academics, 15 PhDs
- brainstorming discussions
- jointly with TMAPPP
- recommendations for IFPRI-funded work
  - multi-scale approach from micro properties to continuum models;
  - mesoscopic scale informed by DEM;
  - identify “gaps” and elucidate failures.

Experiments vs DEM

Experiments
versus
DEM

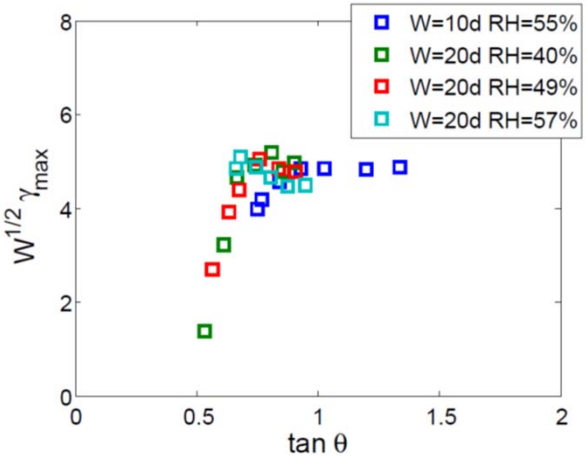


Alexandre Valance, Rennes

Shear rate γ vs channel width W

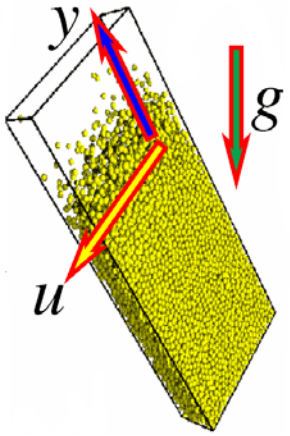
$$\dot{m} \propto \rho W^2 \bar{u} \propto \rho W^3 \gamma$$

Experiments

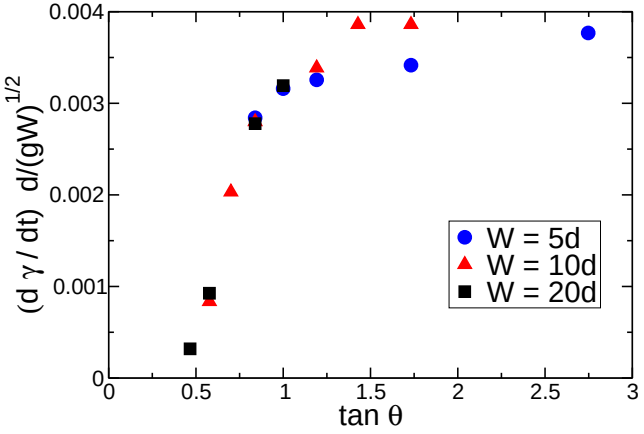


$$\gamma = \frac{du}{dy} \propto \sqrt{\frac{g}{W}}$$

$$\Rightarrow \dot{m} \propto W^{7/2}$$



DEM



$$\gamma = \frac{du}{dy} \propto \frac{\sqrt{gW}}{d}$$

$$\Rightarrow \dot{m} \propto W^{5/2}$$

particle diameter *d*, density ρ

Renewals

- Joe McCarthy (segregation)
  - segregation by size; cohesion; shearing experiment; build own model.

- Colin Hare (indentation vs shear cell)
  - compare with new testing geometries (e.g. uniaxial); DEM; more powders.

New proposals

Mixing Rules for Powder Blending

- Ben Glasser
  - compare PIV in cylindrical mixer with DEM;
  - characterize segregation by fixing with glue;
  - glass beads, then cohesion with liquid; shape in year 3.
  - MRI mentioned.

- Indresan Govender
  - compare PET with DEM in rotating drum; incorporate cohesion.

The role of consultants

Identify and suggest bright stars