Dry systems forward look

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IFPRI AGM Burlington, VT,

June 25, 2019

Dry systems portfolio

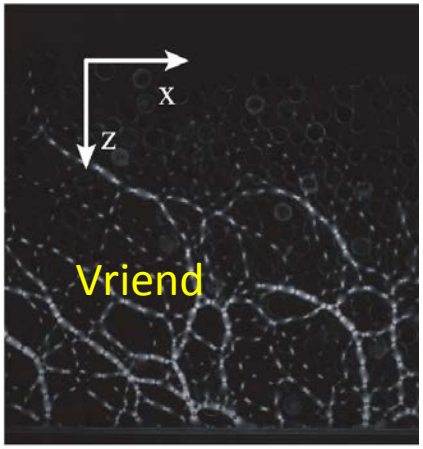
- Karen Daniels (rheology) until 2021
- Joe McCarthy (segregation) until 2020
- Colin Hare (yield) until 2020
- Indresan Govender (mixing) renewal 2020
- Charlie Wu (die filling) until 2019
- Nathalie Vriend (with Daniels) collab. report

Related initiatives

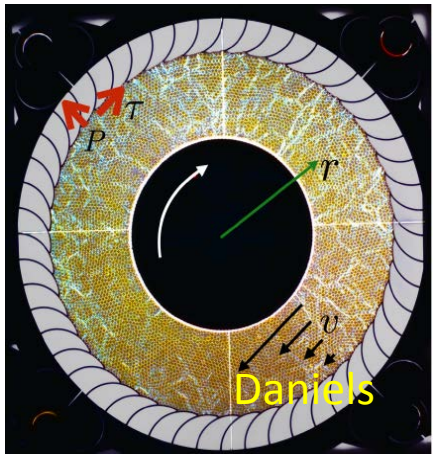
- DEM Round-Robin (Birmingham)
  - high-shear and drum
  - characterization, PEPT tracers, DEM
- Magnanimo (dry systems challenge)

What we learned

free surface



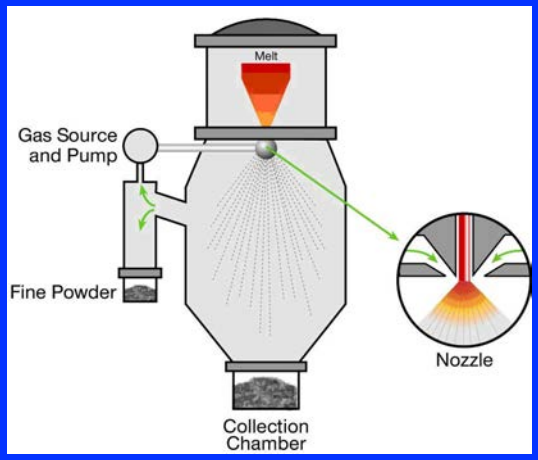
confined flows



the power of instrumentation

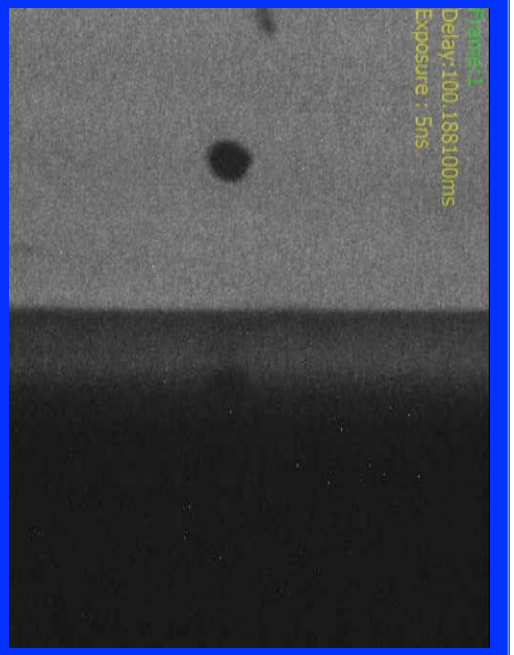
Synergy with results from Joe McCarthy and Indresan Govender

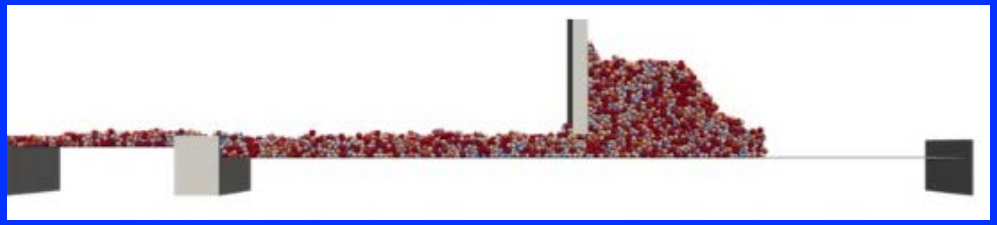
Forward look



thin flows
powder synthesis

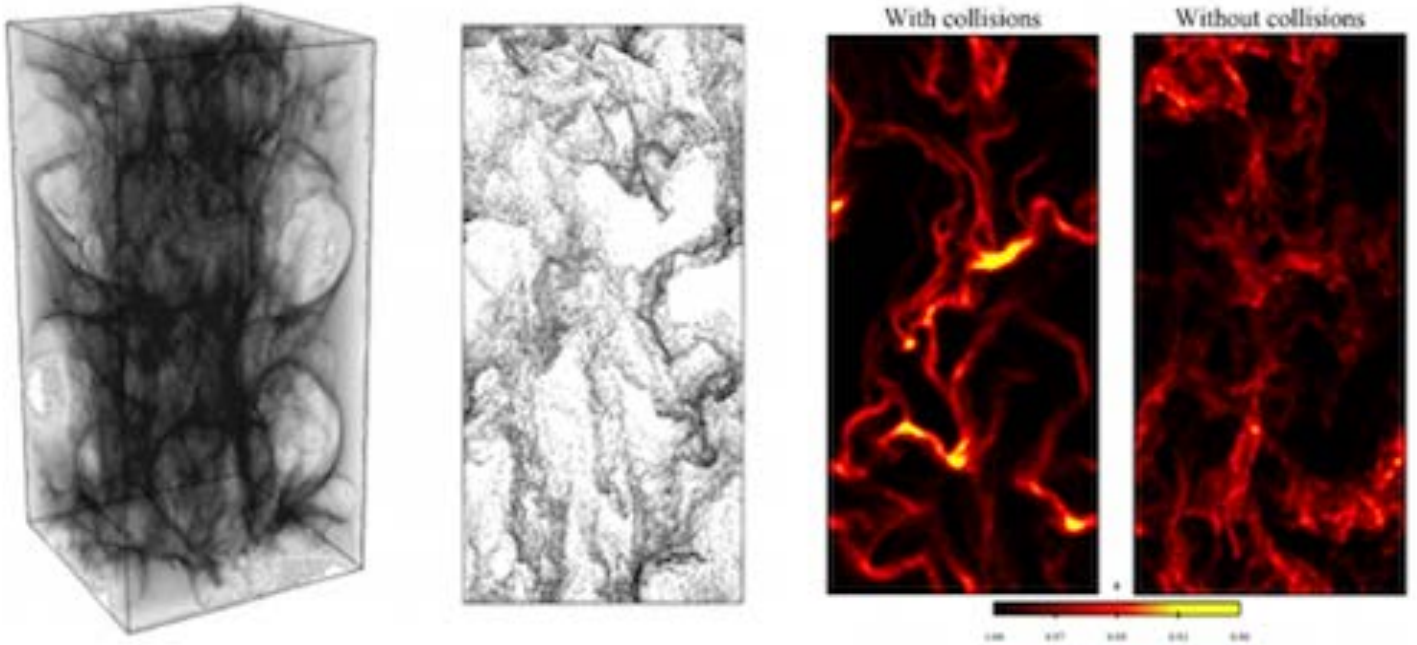
Atieh Moridi
Mostafa Hassani





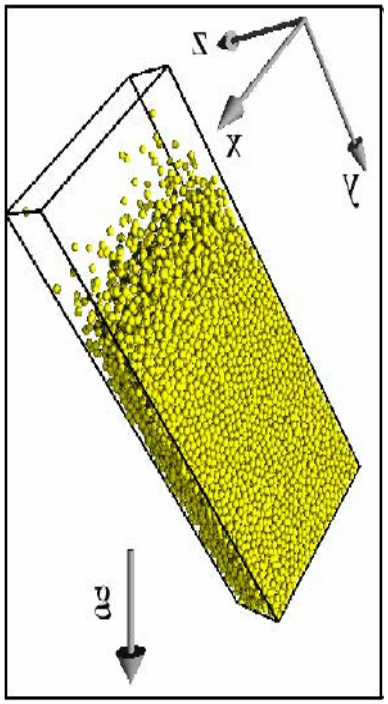
Forward look

gas-solid flows, atomization



Olivier Desjardins

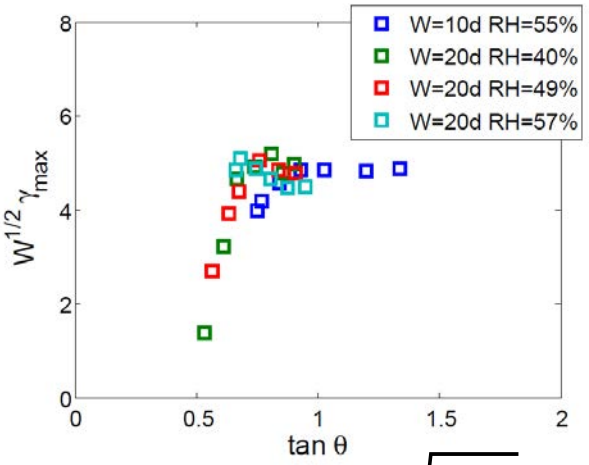
Experiments vs DEM

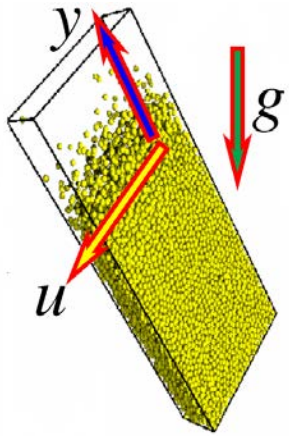


Alexandre Valance. Renaud Delannay,
IPR Rennes

Shear rate γ vs channel width W

Experiments





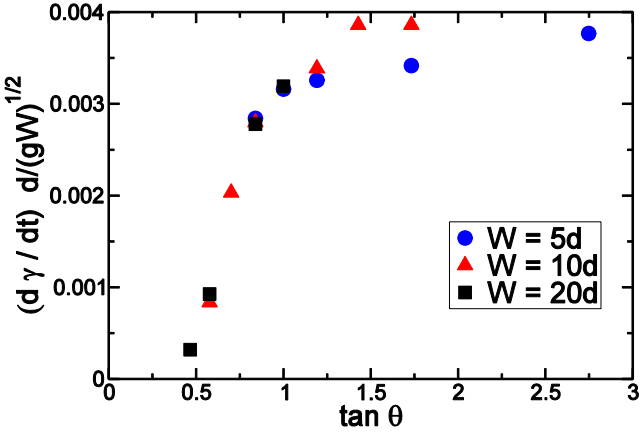
$$\gamma = \frac{du}{dy} \propto \sqrt{\frac{g}{W}}$$

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

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

particle diameter *d*, density ρ

DEM



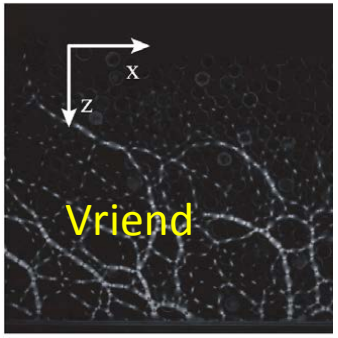
$$\gamma = \frac{du}{dy} \propto \frac{\sqrt{gW}}{d}$$

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

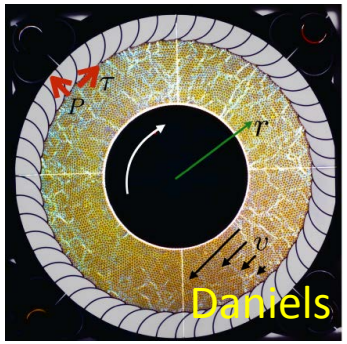
Experiments and DEM fundamentally disagree

Thank you

free surface

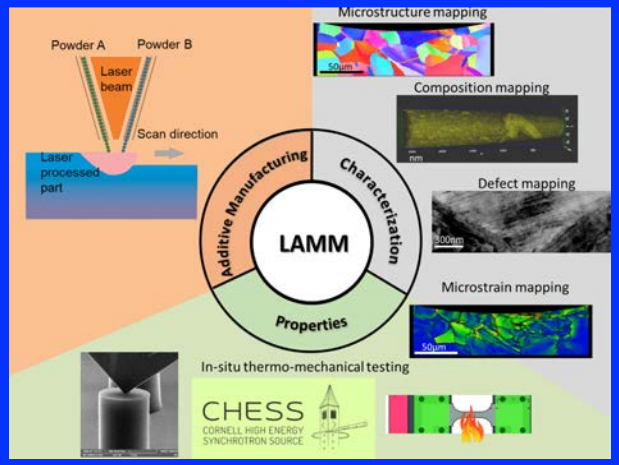


confined flows



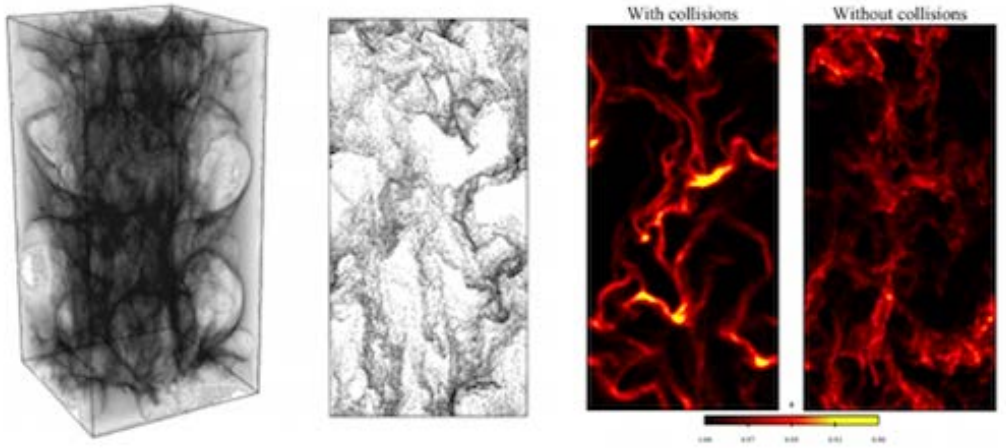
the power of instrumentation

thin flows



Atieh Moridi

gas-solid flows



Olivier Desjardins

Avalanche precursors: collective effects