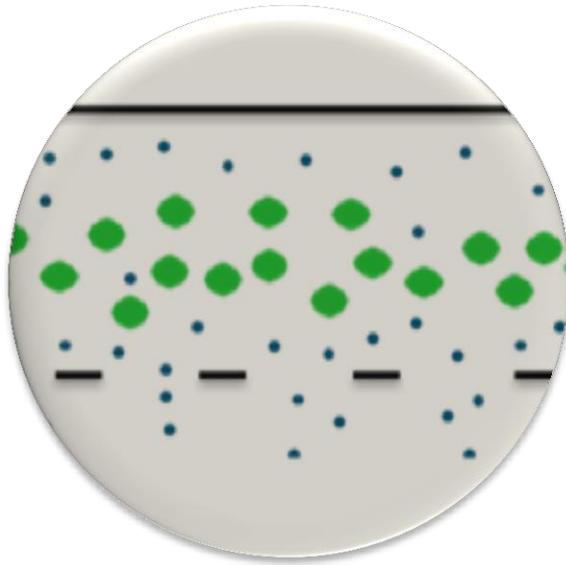


Constant flux microfiltration with sieves with uniform pores

Ivon Drijer

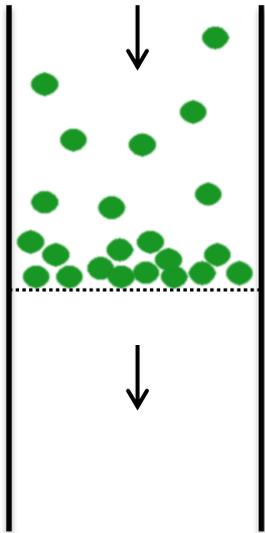
Karin Schroën

October 12th 2016

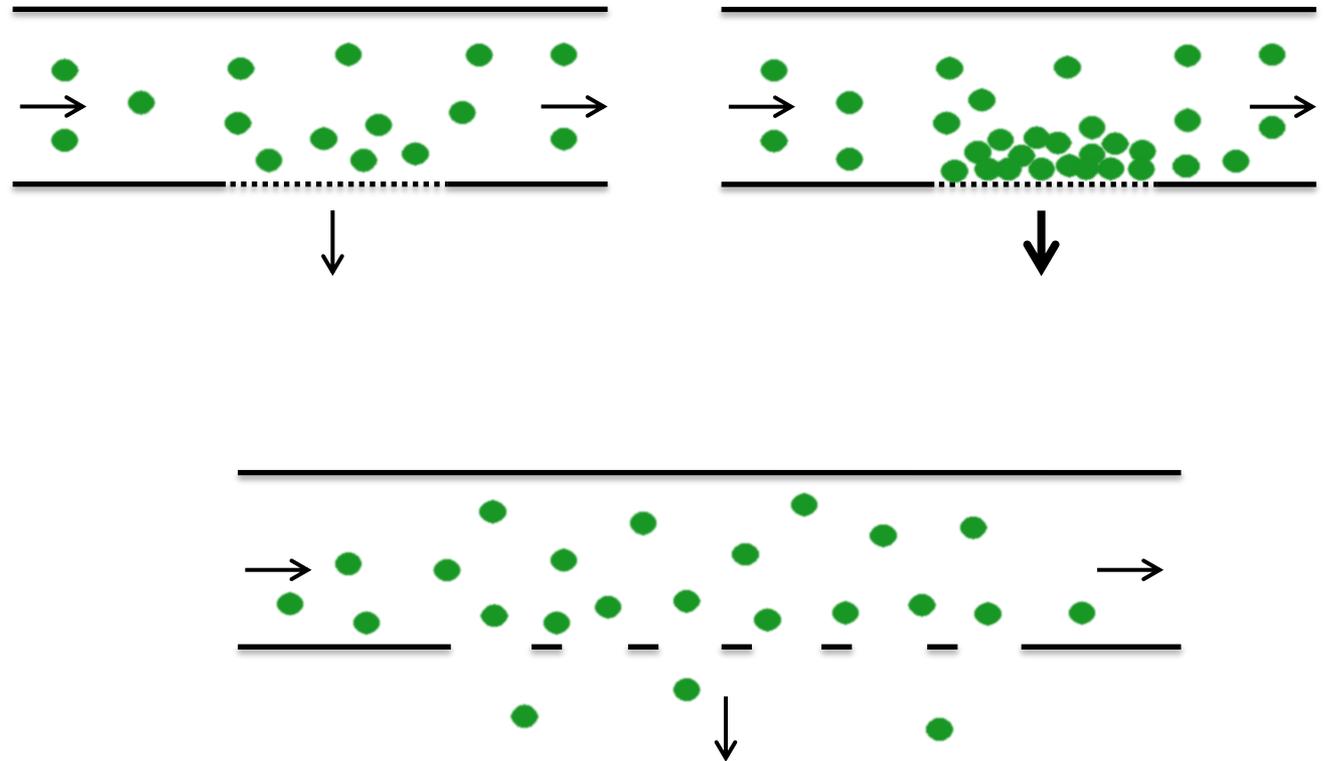


Membrane microfiltration

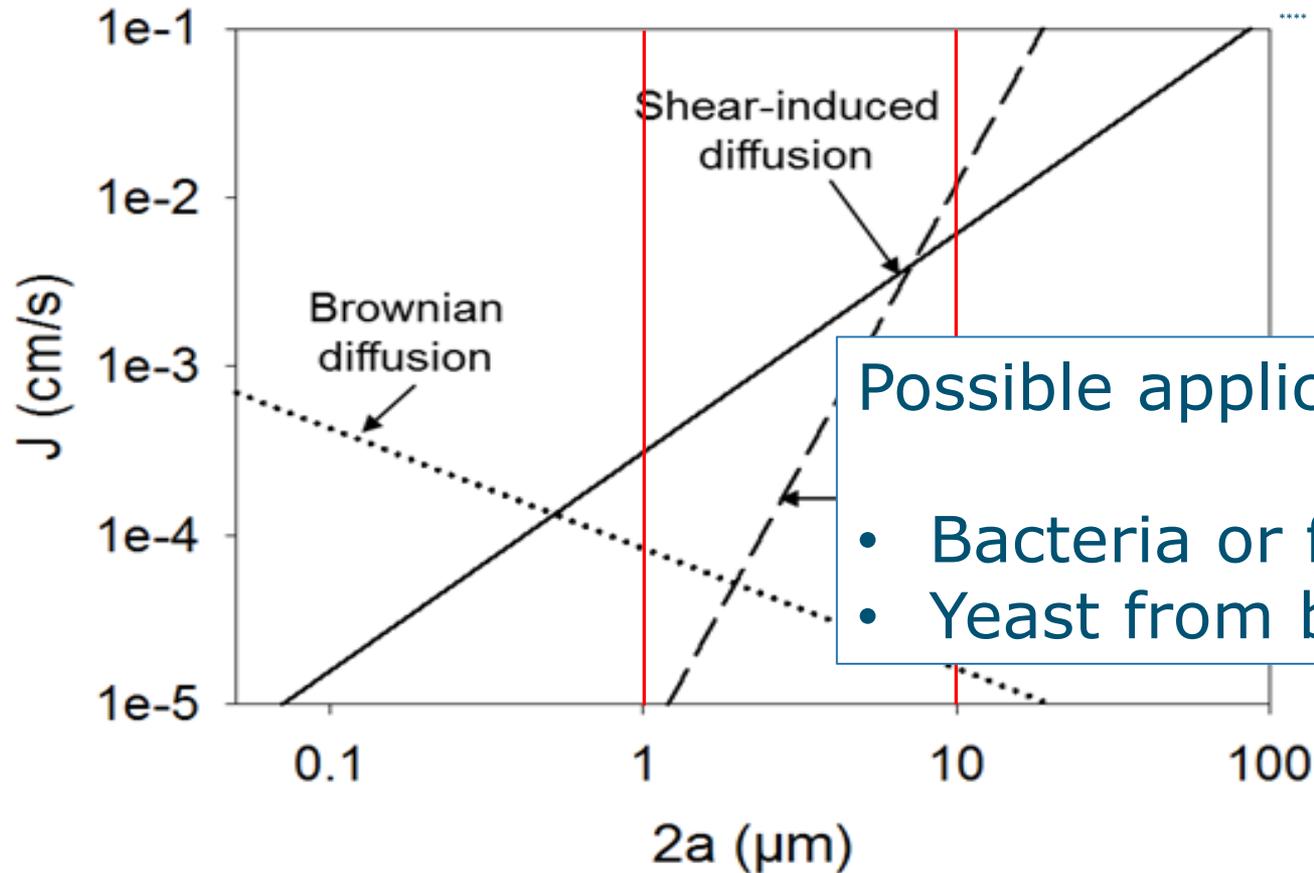
Dead-end filtration



Cross-flow filtration



Mechanisms for movement



Possible applications:

- Bacteria or fat from milk
- Yeast from beer

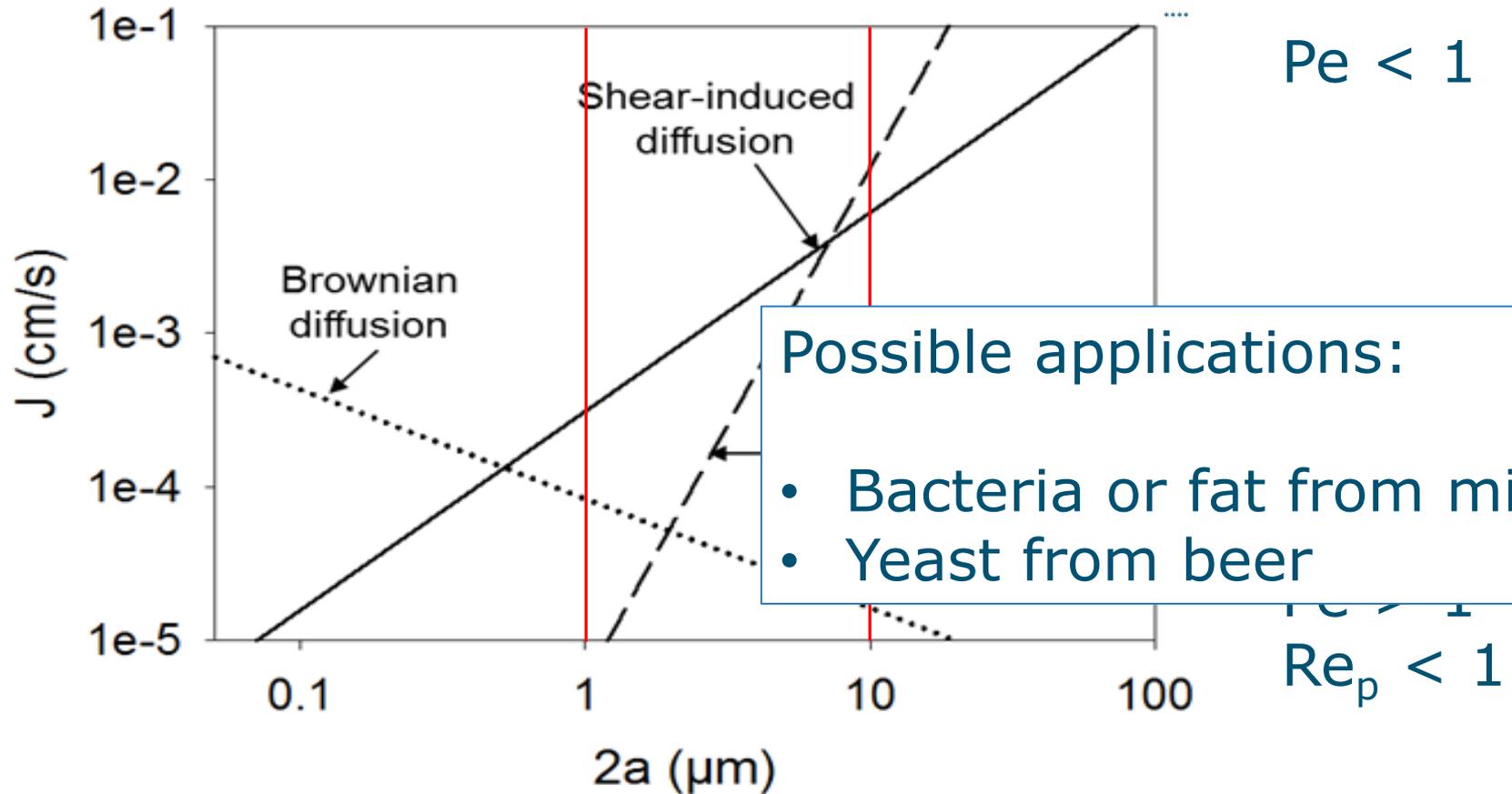
* <http://quantumfreak.com/motion-of-molecules/>

** Redrawn from http://web2.clarkson.edu/projects/crcd/me437/downloads/1_4Lift.pdf

*** Kromkamp J., 2005, Particle separation and fractionation by microfiltration, thesis Wageningen University

**** Davis R.H., Separation and purification methods, 21, 1992

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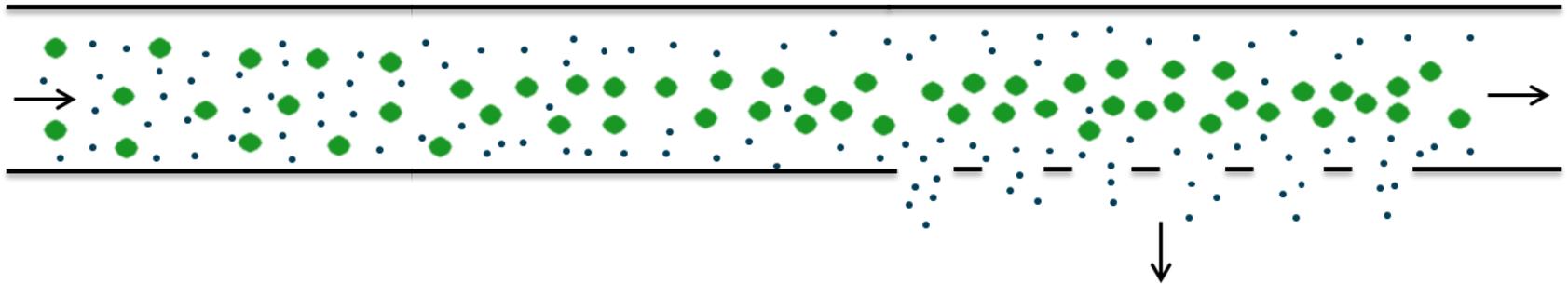
* <http://quantumfreak.com/motion-of-molecules/>

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*** Kromkamp J., 2005, Particle separation and fractionation by microfiltration, thesis Wageningen University

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Shear induced diffusion



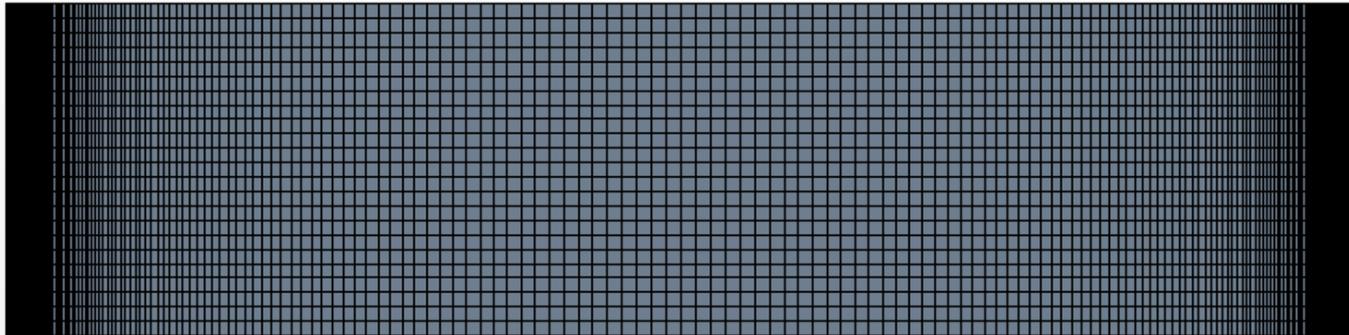
Software program: STAR-CCM+

Simulating multiphase flow:

- 1) Eulerian
- 2) Lagrangian
- 3) Discrete element method

Software program: STAR-CCM+

Length: 4 cm
Height: 50 μm

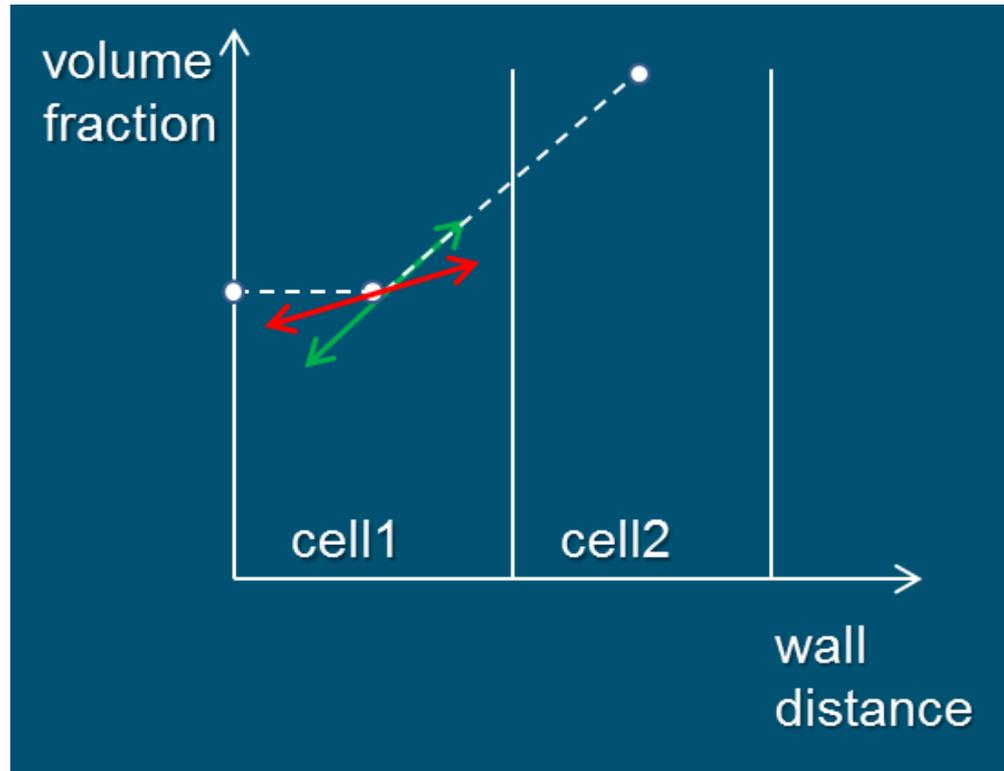


Software program: STAR-CCM+

Simulating multiphase flow:

- 1) Eulerian
- 2) Lagrangian
- 3) Discrete element method

Software program: STAR-CCM+



Michael Descamps, CD-adapco

Software program: STAR-CCM+

Simulating multiphase flow:

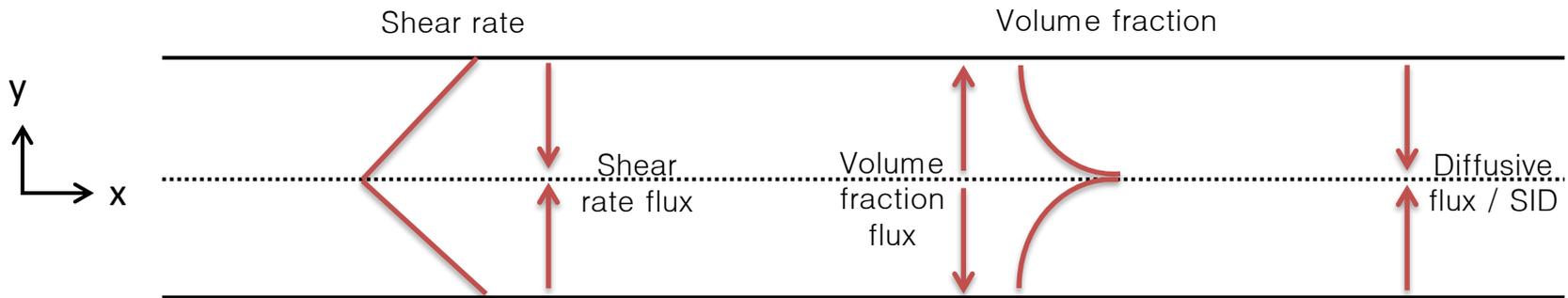
1) Eulerian

2) Lagrangian

3) Discrete element method

Particle-particle interactions: SID

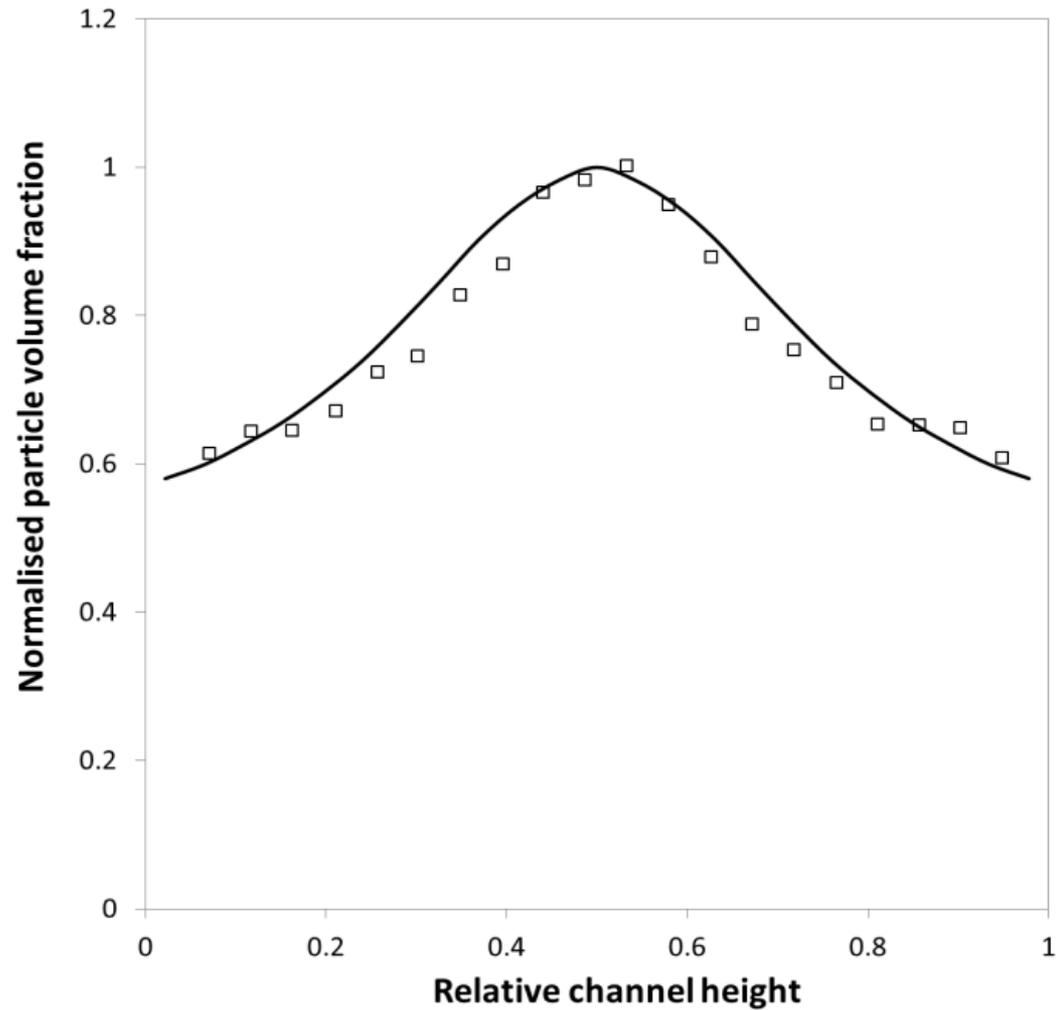
Closed channel monodisperse suspension



$$\text{Diffusive flux} = \text{shear rate flux} + \text{volume fraction flux}$$

Experimental validation

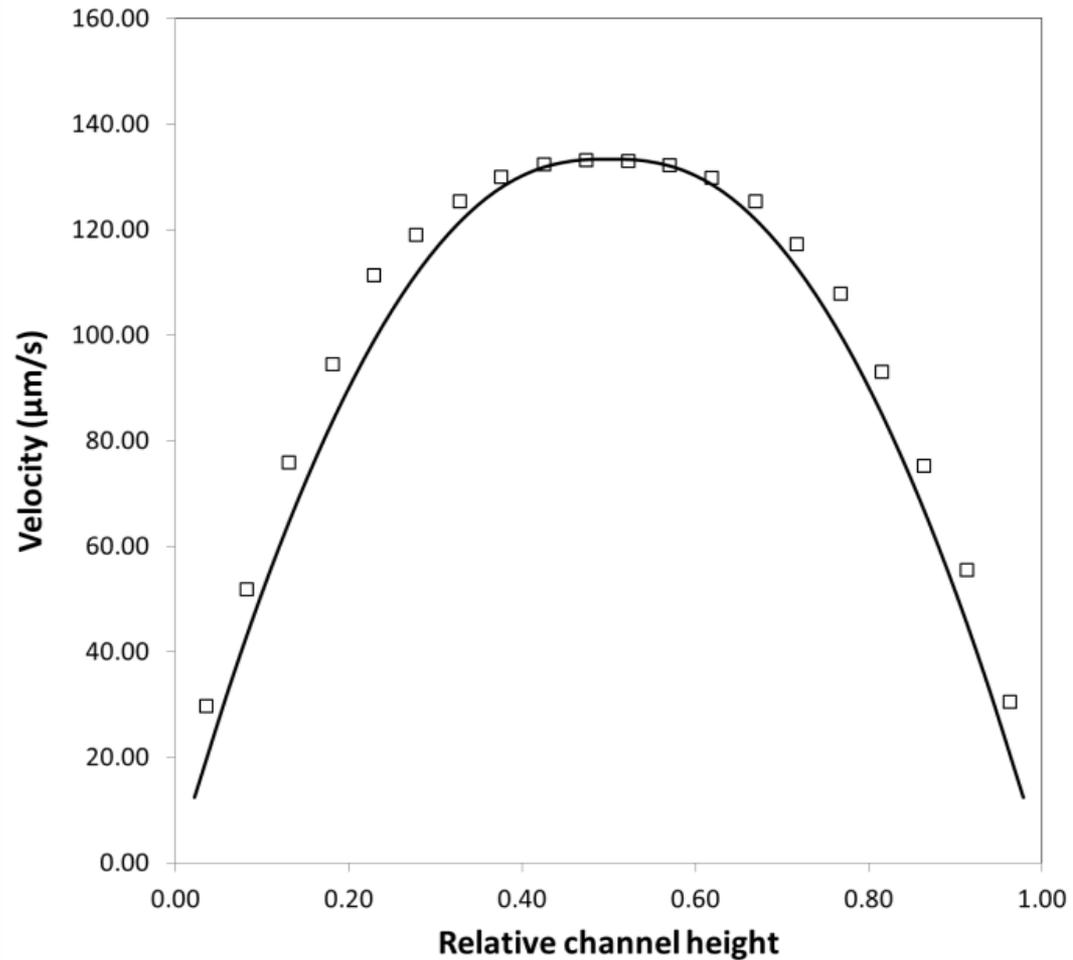
Ties van de Laar



50% particle volume fraction

Experimental validation

Ties van de Laar



30% particle volume fraction

Conclusion closed channel

CFD model



Good fit to experimental results

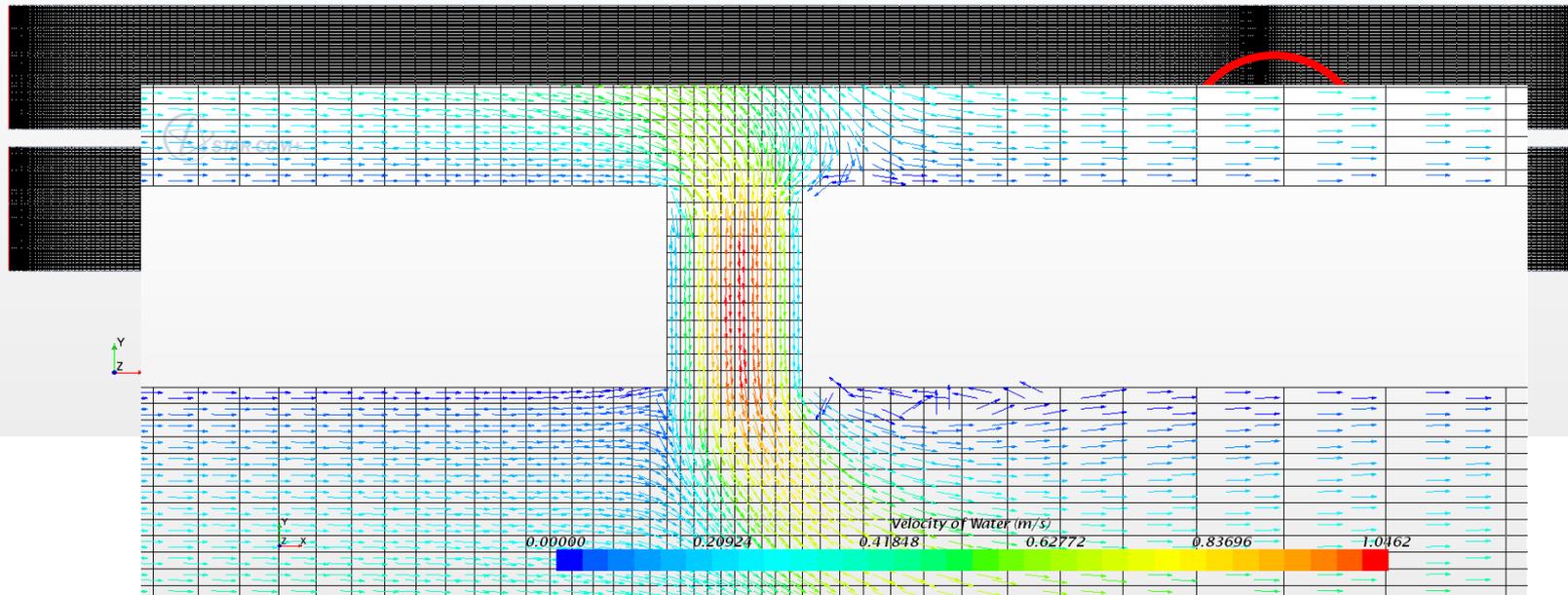
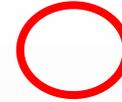


Flexible process design

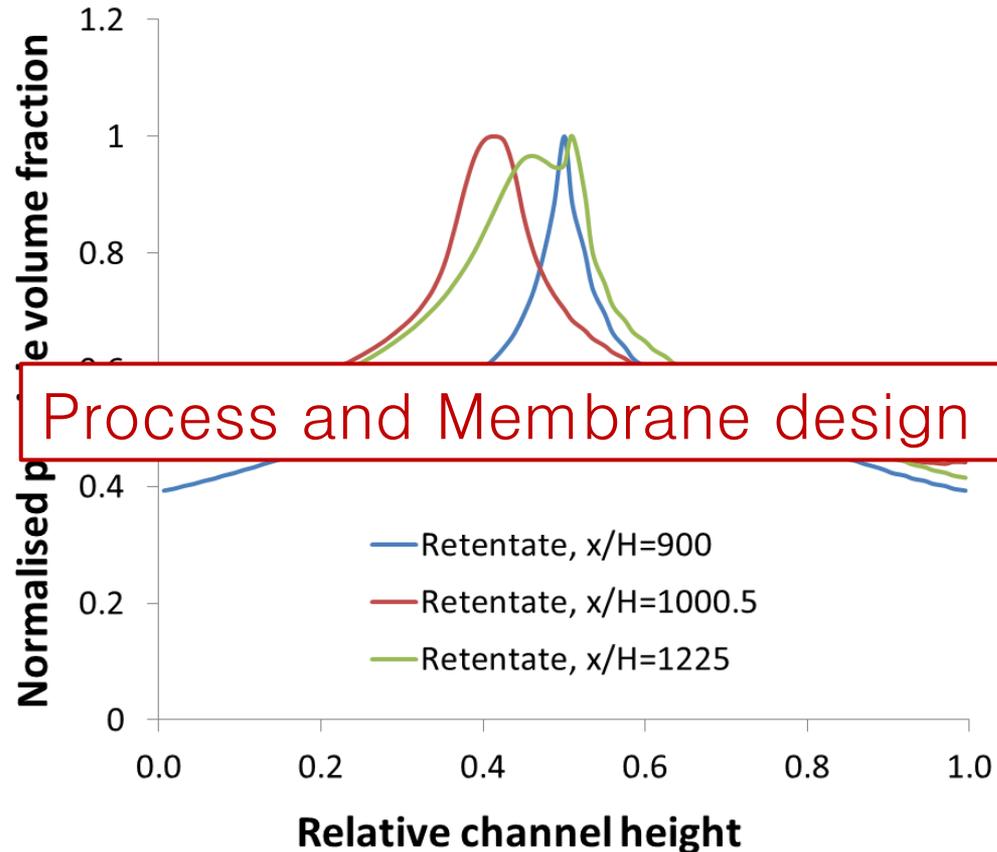


Next step: porous channel

Porous channel monodisperse suspension



Porous channel monodisperse suspension



Questions or suggestions?

