standardized settling cell design

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agenda

- introduction
- Henschke settling cell
- shaking settling cell
- coalescence model
- results
- summary
large gravity settlers in the industry

➔ ERICAA project

- partners:
  Bayer Technology Services, Franken Filtertechnik, SOPAT, Normag, LANXESS Deutschland, Raschig, INEOS Phenol, Linde, Covestro, TU Berlin, TU Kaiserslautern, University of Liège
ERICAA project: our goals

- definition of an appropriate coalescence model
- design and validate an optimized standardized lab-scale settling experiment
Henschke settling cell

double-wall glass vessel

2 counter-rotating shafts

engine

second vessel for internals
settling experiment

- repeated 3 times
- settling time criteria
- movie used to define initial $d_{32}$ and $r_s^*$
experiments parameters evaluation
shaking settling cell

- bottles
- light
- linear ball bearing
- engine
- crank
settling experiment
coalescence model: theory

\[ \omega = \lambda \quad h = h \exp\left( -\frac{t_{\text{coalescence}}}{t_{\text{contact}}} \right) \]
coalescence model: collision frequency

- collision frequency

\[
\text{collision frequency} = \frac{\text{Area}_{\text{collision}}}{\text{Area}_{\text{cell}}} \div \frac{\text{t}_{\text{collision}}}{t_{\text{collision}}}
\]
coalescence model: contact time

- assumptions:
  - big drop contour followed by the small drop during the sedimentation
  - detachment angle = opposite of the collision angle
contact time for different collision angle

average contact time in s: 0.2503
contact time with a drop of 1 mm

![Graph showing the relationship between contact time and second drop diameter in mm.](image)
summary

- different settling cell devices with different characterization tools
- design of a unified standardized cell
- development of a coalescence model
standardized settling cell design

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