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

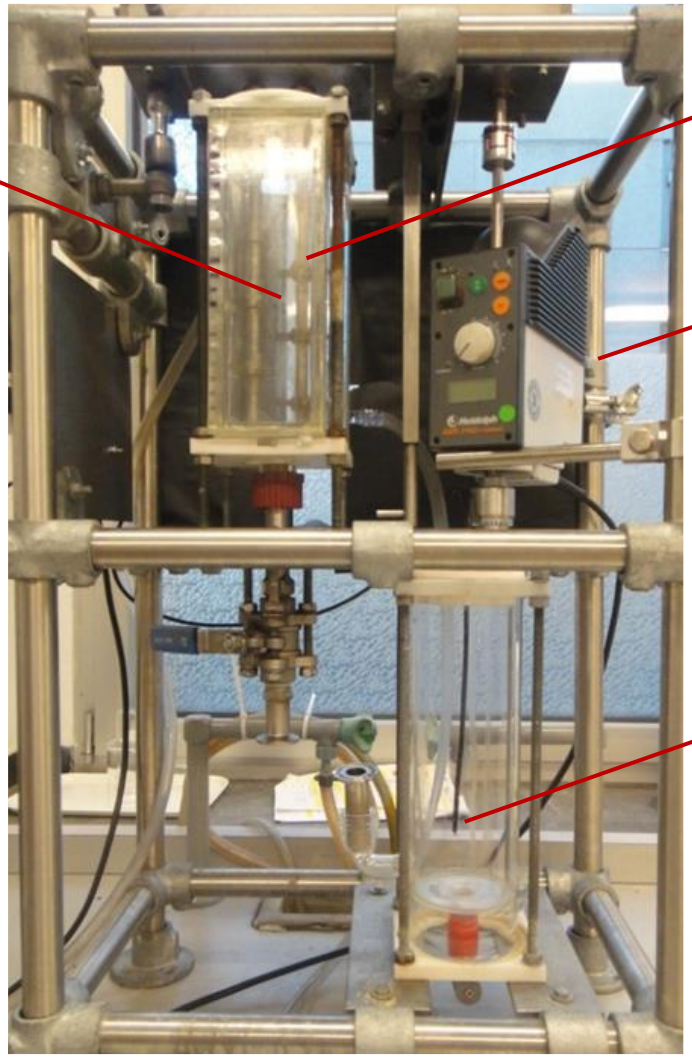
- partners:

  Bayer Technology Services, Franken Filtertechnik, SOPAT, Normag, LANXESS Deutchland, 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

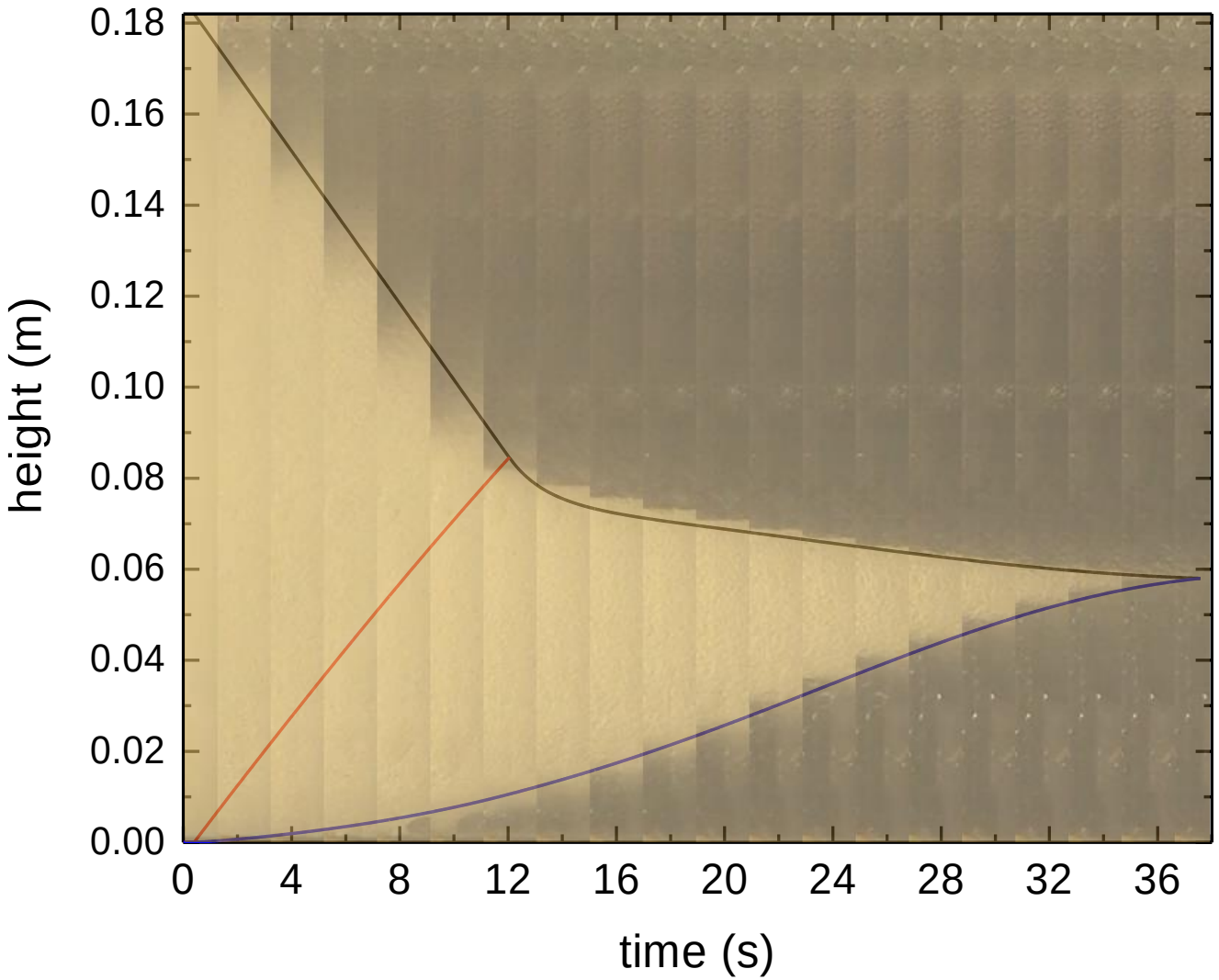
engine

second vessel
for internals

settling experiment

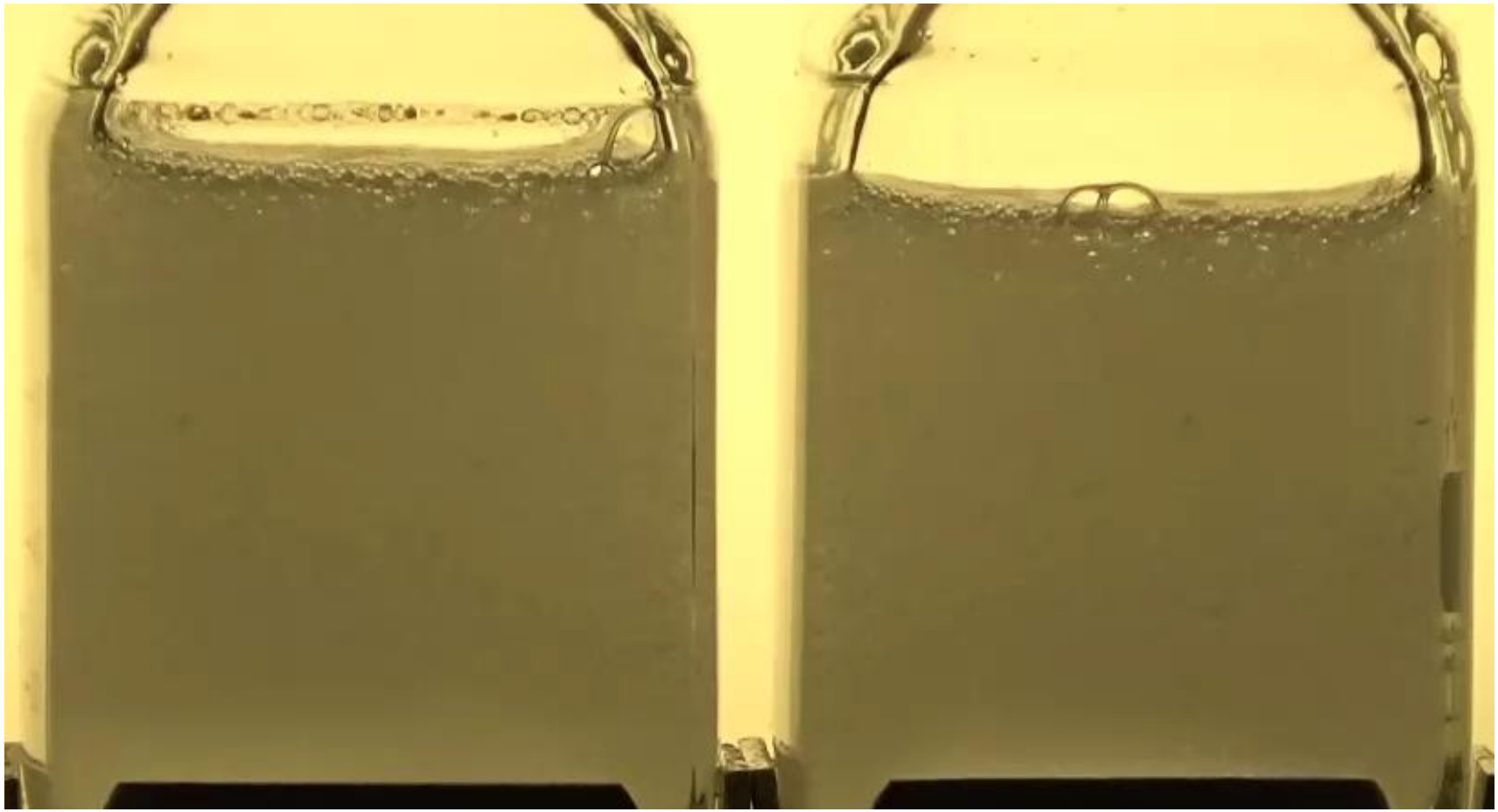
- repeated 3 times
- settling time criteria
- movie used to define initial d_{32} and r_s*

experiments parameters evaluation

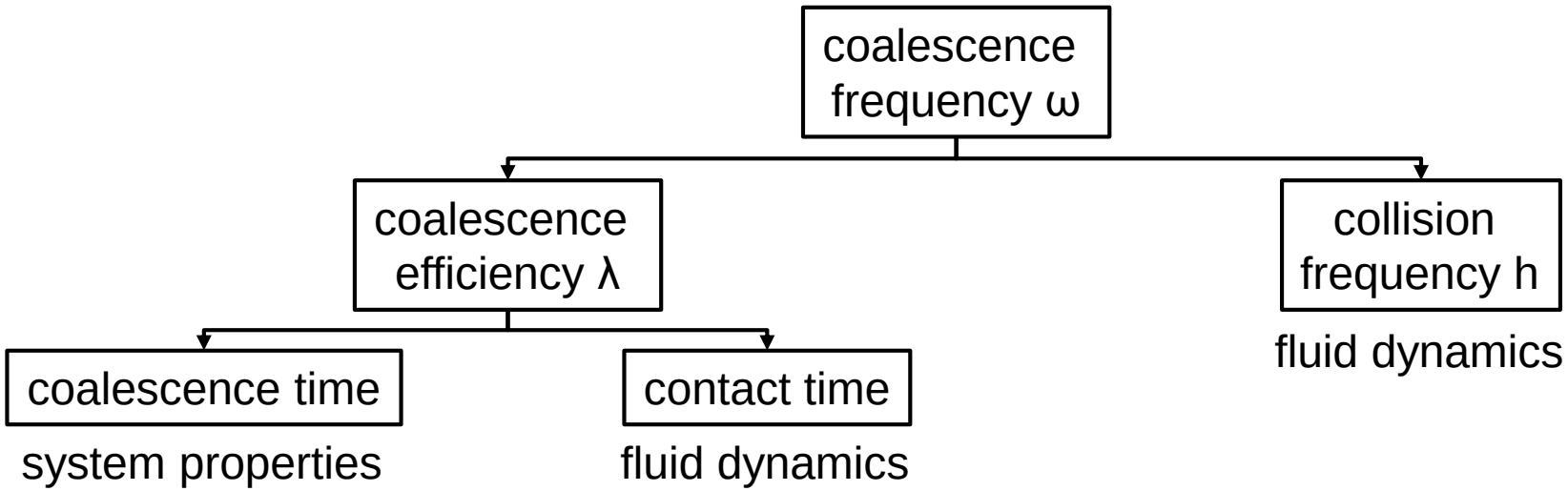


shaking settling cell

settling experiment



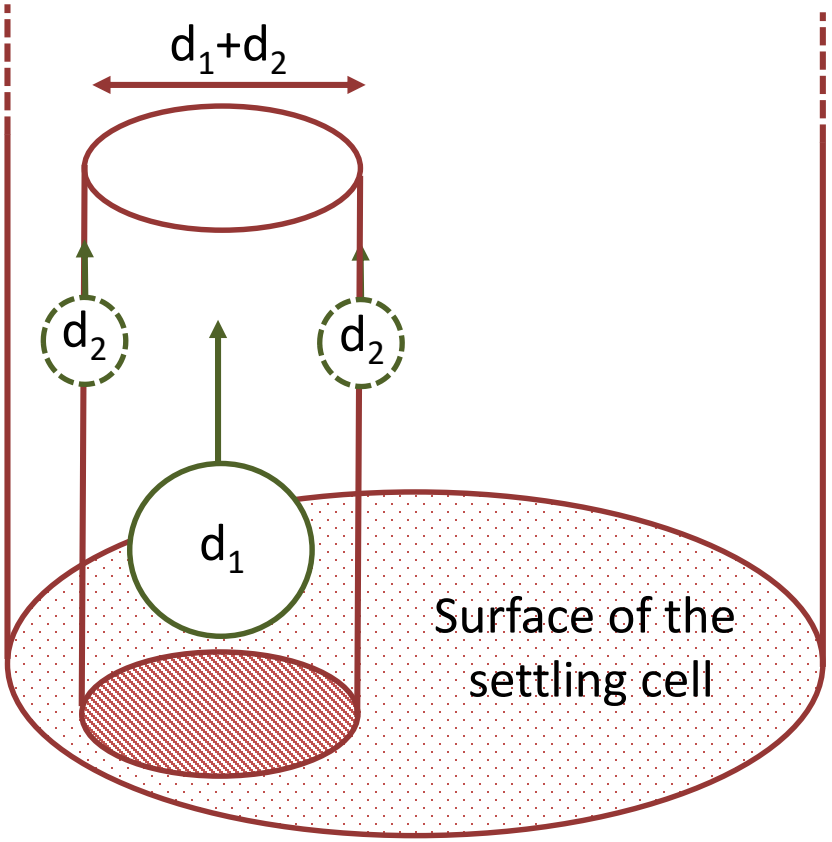
coalescence model: theory



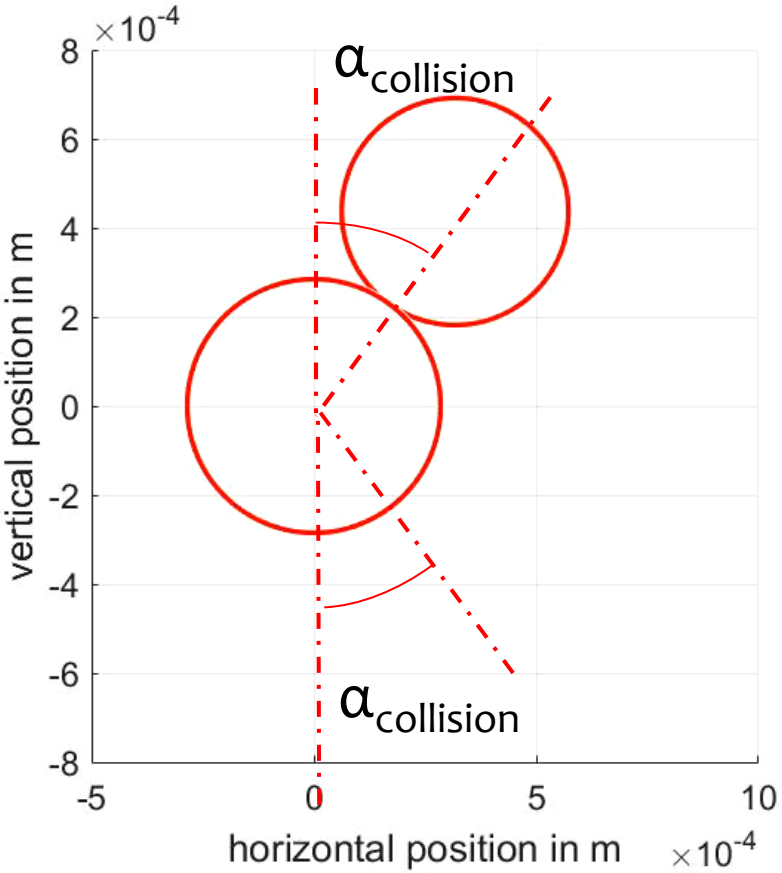
$$\omega = \lambda \;\; h = \mathrm{h}\exp(-\frac{t_{coalescence}}{t_{contact}})$$

coalescence model: collision frequency

- $collision\ frequency = \dfrac{Area_{collision}/Area_{cell}}{t_{collision}}$

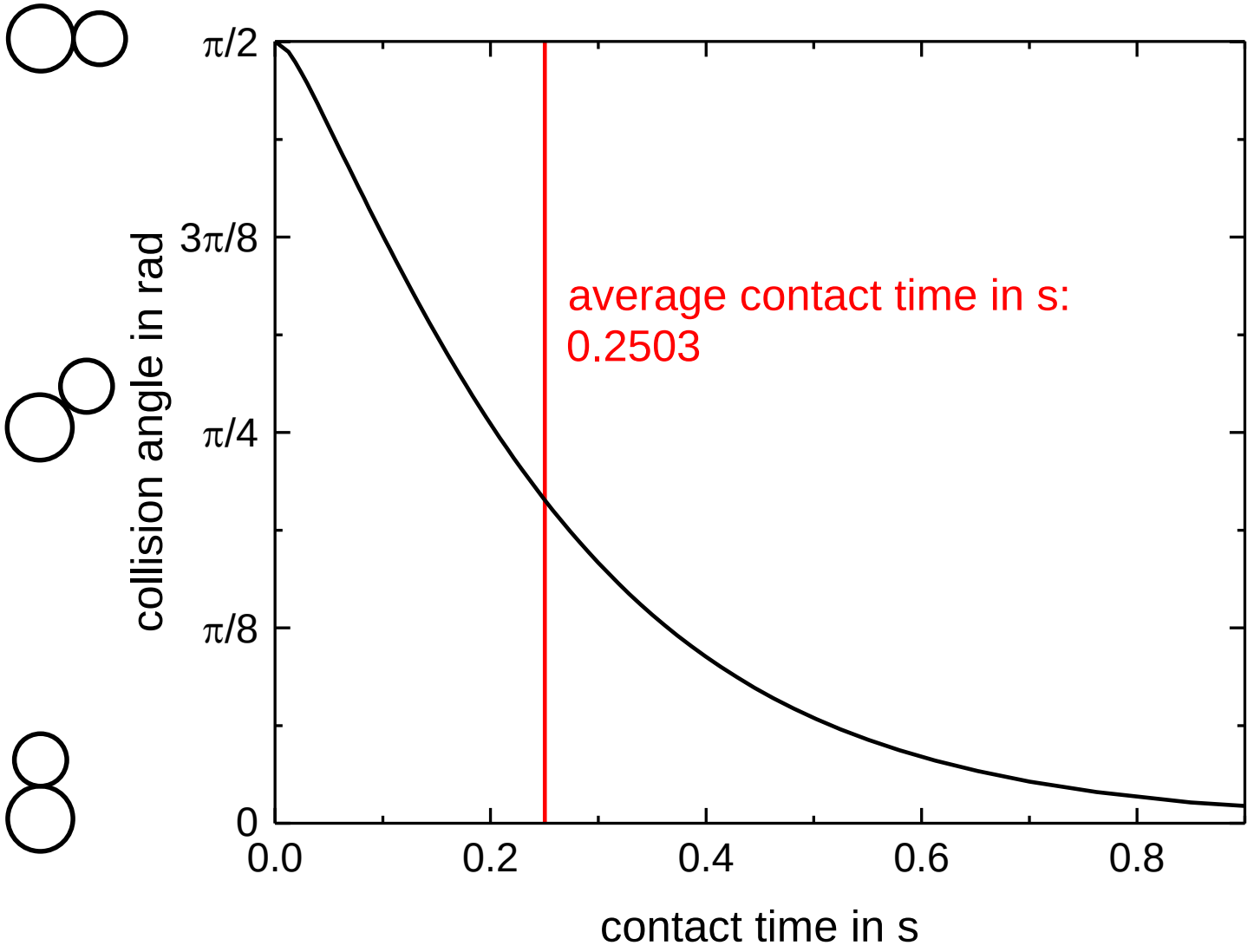


coalescence model: contact time

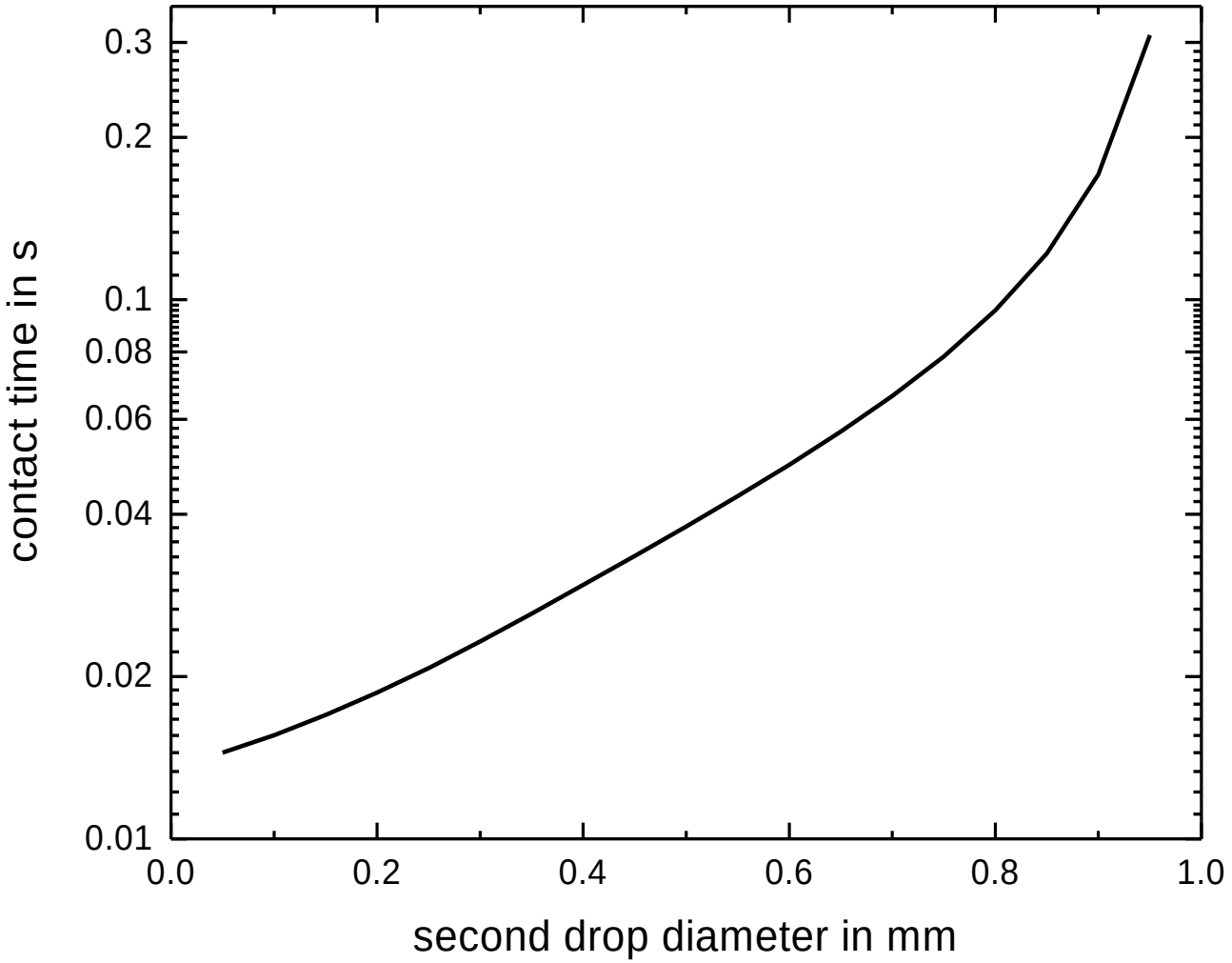


- assumptions:
  - big drop contour followed by the small drop during the sedimentation
  - detachment angle = opposite of the collision angle

contact time for different collision angle



contact time with a drop of 1 mm



summary

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

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