Dynamic contact angle of an impinging water droplet

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Experiments in Fluid Mechanics

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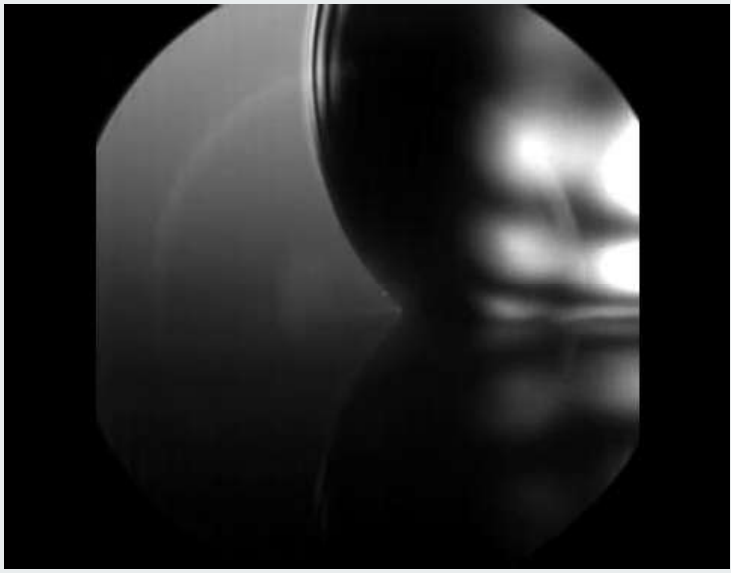
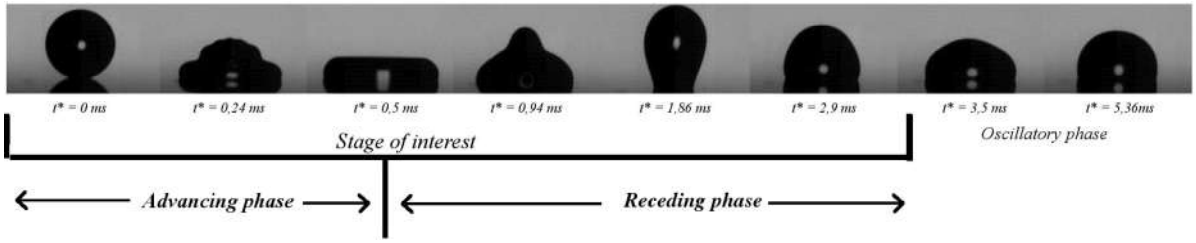
Agenda



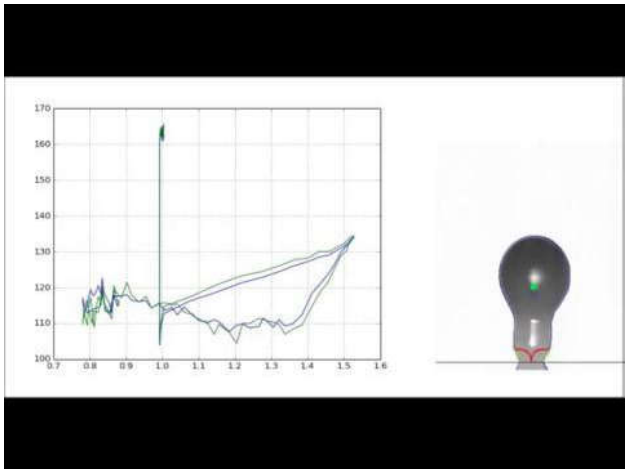
- Experiments description
- State of the art
- Hypothesis
- Results
- Summary

Experiment description I

- Governing parameters and numbers
  - *D, V, t, Θ, We, Re,*
- Different motion phases
  - Advancing
  - Receding
- Popular phenomenon
  - Modern surfaces
- Fast changing
  - Recording at 40 - 70kfps



Experiment description II

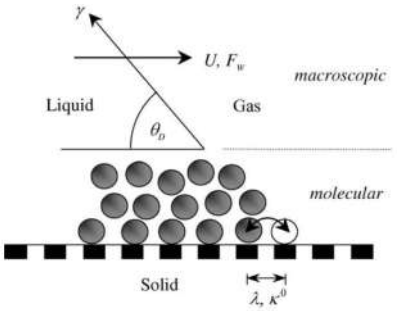


- Different surfaces
- Receding & spreading
- Contact angle variation
- Velocity importance $\mathbb{C}a = \frac{\mu V}{\sigma}$

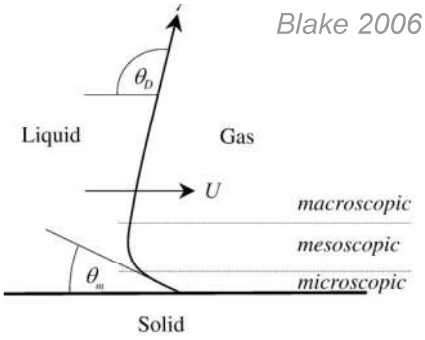
Interface modelling I

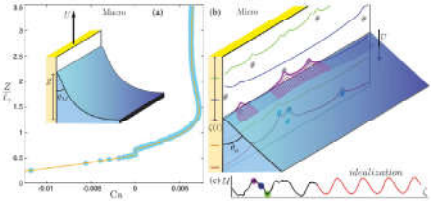
- Length scales importance Knudsen number
  - Scales from 1nm to 1mm l -> L
- Macroscopic angle attributed to
  - viscous bending of the liquid–gas interface within a mesoscopic scale - not observable
- Defects at nanoscale have effect on Contact line - *Perrin et al. 2016*

$$\mathbb{K}n = \frac{l}{L}$$



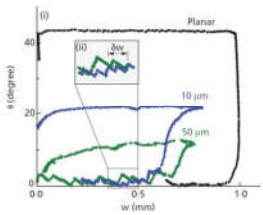
Blake 2006

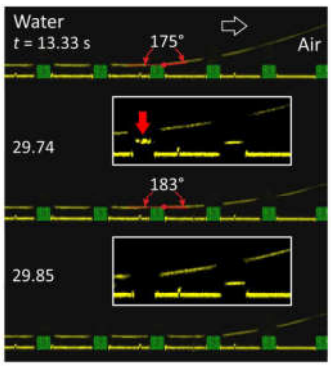




Interface modelling III

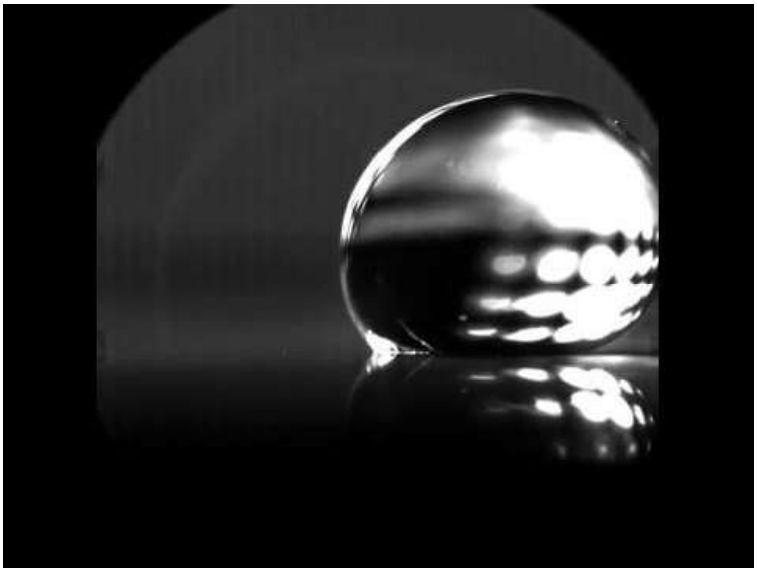
- So called “Stick slip” behaviour
- Contact angle ~ 180° !





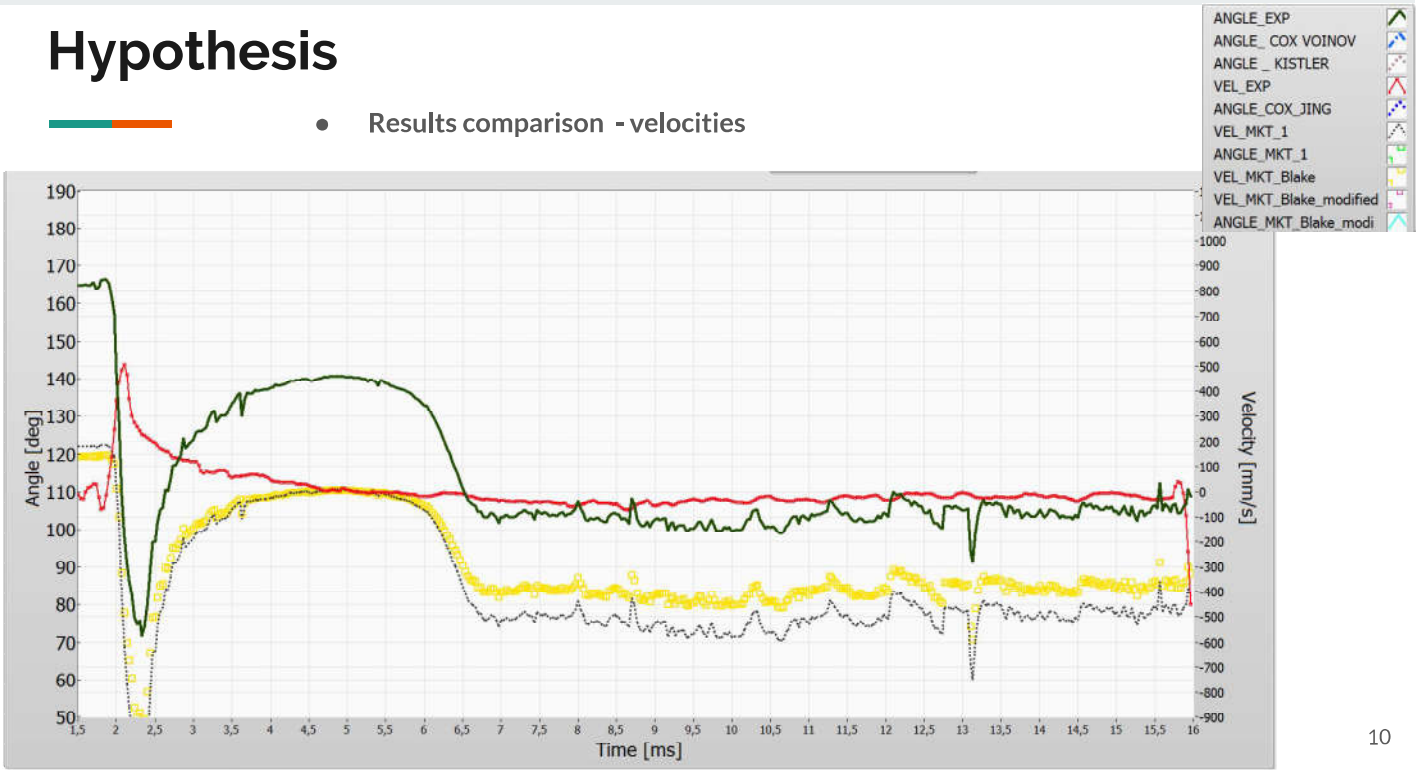
Schellenberger et.al 2016

Authors material



Hypothesis

- Results comparison - velocities



Summary and remarks

- Experiment for the different surfaces and droplets are done
- Good agreement of the results for low contact line velocities
- Differences for contact angle results
- Proper angles determination is needed (microscopic/ macroscopic)