Physics/Mathematics double degree BSc project:
Adhesive Force of Droplets with Increasingly Realistic Shape

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Water droplets on a window are an extremely common sight in the Netherlands. But have you ever wondered what the reason is that droplets can hang on the window while gravity obviously is trying to force them down? The force counteracting gravity is the surface force of the droplet, the imbalance in surface force around the droplet to be more specific. Although simple conceptually we are still unable to predict something as trivial as the maximum droplet size which can still hang on the window. To be able to do this we need to predict how the adhesive force depends on the droplet properties.

What is this project about?

In this project you theoretically and numerically investigate how the adhesive force depends on two key parameters: (i) the shape of the droplet base (which is roughly egg-shaped) and (ii) the variation of the contact angle of the droplet along this base.

This involves the, possibly analytical, integration of the tough line integrals that mathematically describe the adhesive force of the droplet. You will compare your analytical solutions to numerical solutions of the finite element code Surface Evolver. If you are interested, you may also participate in an experimental project, which runs in parallel, in which the adhesive forces are measured.

Interested?!

Please send me an email at m.musterd@tudelft.nl or drop by my office: room 0.519 in the ChemE building.