Descriptions of the videos for "Numerical-experimental observation of shape bistability of red blood cells flowing in a microchannel"

Achim Guckenberger,[a] Alexander Kihm,[b] Thomas John,[b] Christian Wagner,[b c] Stephan Gekle[a]

Dated: January 22, 2018

Description of the videos

The supplementary material includes several videos, which all show the time evolution of a single red blood cell in the rectangular microchannel as obtained via numerical simulations. Since the reference state for the in-plane elasticity (Skalak model) is a discocyte, the two surface points corresponding to the dimples in this discocyte reference shape are special. They are highlighted throughout the videos by the two gray spheres (which have otherwise no physical meaning). After showing the initial setup, the videos depict the evolution of the cell. The real time in seconds is indicated in the lower left corner, and the imposed flow is along the positive x-direction. The individual videos are:

- Movie `NonTTCroissant`: The initial offset is $r_{\text{init}} \approx 0.34\,\mu\text{m}$, the cell starts as a discocyte and the cell velocity in the final steady state is on average 6.6 mm/s. In this case, the final shape is a non-tank-treading croissant. This video corresponds to the inset in figure 5 from the main text depicting the croissant.
- Movie `TTSlipper`: The initial offset is $r_{\text{init}} \approx 1.2\,\mu\text{m}$, the cell starts as a discocyte and the cell velocity in the final steady state is on average 6.5 mm/s. In this case, the final shape is a tank-treading slipper. This video corresponds to the insets in figure 5 from the main text depicting the slipper.
- Movie `TTCroissant`: The initial offset is $r_{\text{init}} \approx 0.17\,\mu\text{m}$, the cell starts as a slipper and the cell velocity in the final steady state is on average 7.8 mm/s. In this case, the final shape is a tank-treading croissant.
- Movie `NonTTSlipper`: The initial offset is $r_{\text{init}} \approx 1.2\,\mu\text{m}$, the cell starts as a croissant and the cell velocity in the final steady state is on average 0.26 mm/s. In this case, the final shape is a non-tank-treading slipper (i.e. the dimple markers rotate with the same angular velocity as the cell itself).
- Movie `LongCroissant`: The initial offset is $r_{\text{init}} \approx 1.9\,\mu\text{m}$, the cell starts as a discocyte and the cell velocity in the final steady state is on average 2.8 mm/s. In this case, the final shape is a non-tank-treading croissant. However, it takes around 14 seconds to reach that state. Figure S6 (b) in the supplementary PDF shows the corresponding evolution of the radial position.

[a]Biofluid Simulation and Modeling, Fachbereich Physik, Universität Bayreuth, Bayreuth
[b]Experimental Physics, Saarland University, 66123, Saarbrücken, Germany
[c]Physics and Materials Science Research Unit, University of Luxembourg, Luxembourg, Luxembourg