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Platelet aggregation in complex vessel geometries

An in silico study on cellular blood flow mechanics

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Publication date

2024

[Link to publication](#)

Citation for published version (APA):

Spieker, C. J. (2024). *Platelet aggregation in complex vessel geometries: An in silico study on cellular blood flow mechanics*. [Thesis, fully internal, Universiteit van Amsterdam].

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Appendix D

Platelet Binding Model Improvements

The constraint-dependent platelet adhesion and aggregation model presented in Chapter 5 is in a preliminary state and requires further improvements. Figure D.1 displays an overview of improvements that are currently in development and did not become part of this thesis. This includes an extension to the modeled binding process by distinguishing between a temporary and a permanent bond. The former is meant to reflect von Willebrand factor (VWF)-mediated platelet dynamics [209], while the permanent bond is established by integrin-ligand interactions [210]. The temporary binding is realized in the form of an attraction force, which is regulated by distance, shear rate and rate of elongation constraints. The model is further improved by enabling the definition of separate adhesive affinities for the initial binding sites and the aggregate, as they exhibit different adhesive properties *in vivo* as well.

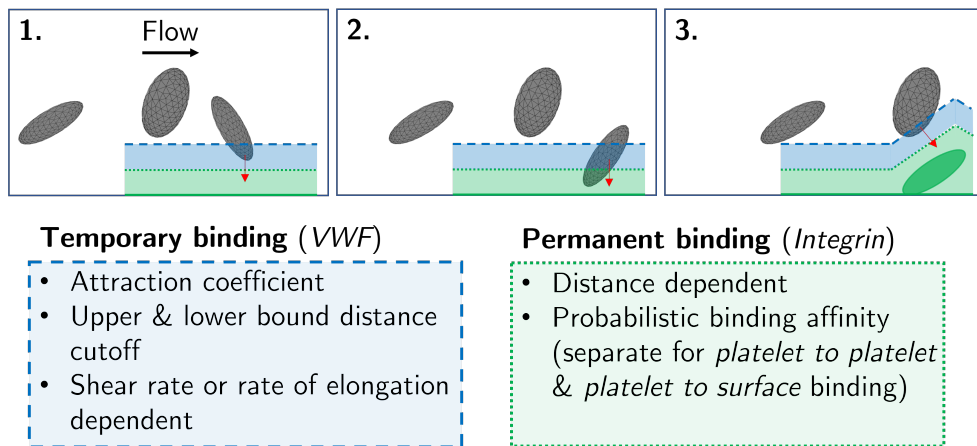


Figure D.1: Overview of extensions and improvements to the platelet adhesion and aggregation model presented in Chapter 5. Model schematics 1., 2. and 3. correspond to the same location at different time steps in successive order. The colored temporary and permanent binding boxes refer to the respective regions in the schematics.