

## Hybrid model of clot formation in flow and its applications

### **Abstract:**

The process of blood coagulation and clot formation in vivo is not yet completely understood. One of the main questions related to haemostasis is why the clot stops growing in normal conditions before it completely obstructs the flow in the vessel, whereas, in pathologic cases, it can continue to grow, often with fatal consequences. Hence, revealing the mechanisms by which the clot grows and stops growing in the flow remains of great importance. In order to study this topic we have developed a hybrid DPD-PDE method where Dissipative Particle Dynamics (DPD) is used to model plasma flow and platelets, while the protein regulatory network is described by a system of partial differential equations. The model describes the interaction between blood flow, platelet aggregation and plasma coagulation. As a result of modelling we propose a new mechanism of clot growth and growth arrest in flow.

The developed model and its parts can be used as a base to modelling of different physiological phenomena related to cell-cell interactions and blood flows. In this context we discuss some prospects of this modelling (e.g. modelling of spontaneous blood coagulation in a case of inflammation).