

## **Rheological properties of Red Blood Cells**

In this work, the rheological properties of human blood are investigated by two different approaches. The flow properties of plasma, the liquid component of blood, is analyzed under three different conditions: shear flow, elongational flow and contraction flow. Up to now, the plasma was considered as a Newtonian fluid, while the non-Newtonian properties of blood were only attributed to the red blood cells. The performed experiments reveal a viscoelastic behavior of the plasma which has to be considered in future studies. In addition to the plasma, also diluted polymer solutions are analyzed in order to find a good model solution for plasma.

The second part concerns the red blood cells. Their adhesion to linear aggregates is held responsible for the well-known shear thinning behavior of blood but the reason for the cluster formation is still not clear. The interaction energy between two red blood cells and the distribution of different sized clusters flowing through narrow channels are measured under the influence of the two macromolecules dextran and fibrinogen. As the aggregates are actually broken at high shear rates, the current understanding is that they would not play a role for the properties of blood flow. However, an increased amount of clusters at physiological fibrinogen concentrations can be shown, even at shear rates which are common in the microvascular system, which clarifies that the aggregation cannot be neglected in the description of blood flow through the capillary network.