

ABSTRACT

Blood is a complex, two-phase fluid that consists of plasma, which is the continuous medium in which cells, proteins and other macromolecules that form the cellular phase, in which its non-Newtonian nature is routed, are suspended. At low shear rates, blood flow is characterized by the intense effects of agglutination. The phenomenon of blood clotting is an indicator of the presence of a pathological condition in the body.

The dissertation aims to analyse the effect of the aggregation phenomenon by studying the flow of blood, in a rectangular microchannel, due to surface tension. Also, the purpose of the work is to analyse the blood flow in the microchannel for the purpose of using it in a diagnostic tool in medical examinations to detect pathological conditions of inflammation.

The introduction refers to the biology of blood, to the basic principles of rheology. Then, through the bibliographic review, an explanation of hemorheology, an analysis of the properties of the erythrocytes and their pathological changes are made. In the experimental procedure, a drop of three samples , a sample of whole blood (WB), a non-aggregated blood sample containing PBS and a Newtonian sample was taken and placed on the micro conductor .During the flow, images were taken along the micro conductor using camera and stored with the use of specialized software Virtual Dub 1.9. Then, using the MATLAB program was calculated the velocities of the meniscus .It was also extracted graphs of shear stresses and shear rates to examine the effect of agglutination and non-Newtonian blood flow.

The results obtained show that meniscus velocity as well as shear rates and shear stress are influenced by the effect aggregation. The dependence of aggregation on some results, however, is not what expected based on theory.

Key words: blood flow, erythrocyte aggregation, microcirculation, viscosity, shear rates, surface tension