IBERIAN MEETING ON RHEOLOGY

"Fundamental and Aplied Rheology"
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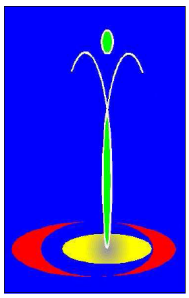
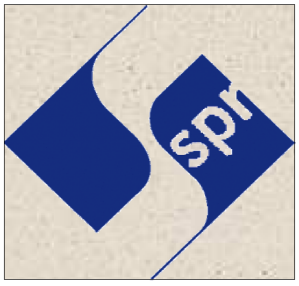
Book of Abstracts





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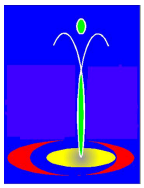


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Contents

PART V
Non-Newtonian Fluid Mechanics

Flow of Red Blood Cells in Microchannel Networks: in vitro studies

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Blood exhibits unique flow characteristics on micro-scale level, due to the complex biochemical structure of Red Blood Cells (RBCs) and their response to both shear and extensional flow, which influence the rheological properties and flow behavior of blood [1,2]. In the past years, several in vitro studies where made and have revealed some physiologically significant phenomena, such as Fahraeus and Fahraeus-Lindqvist effect, that played a key role in recent developments of lab-on-chip devices for blood sampling, analysis and cell culturing [1,3]. However, the blood flow in microvascular networks phenomena it remains incompletely understood. Thus, it is important to investigate in detail the behavior of RBCs flow occurring at a microchannel network, such as with divergent and convergent bifurcations. Previews in vitro studies in microchannels with a simple divergent and convergent bifurcation, have shown a pronounced cell depleted zone immediately downstream of the apex of the convergent bifurcation [1,4]. In the present work, by using a high-speed video microscopy system, we investigated the cell depleted zone in a microchannel network. The working fluid used in this study was dextran 40 (Dx40) containing about 10% of haematocrit level (10 Hct) of ovine red blood cells. The high-speed video microscopy system used in our experiments consists of an inverted microscope (IX71, Olympus, Japan) combined with a high-speed camera (i-SPEED LT, Olympus). A syringe pump Apparatus (PHD ULTRATM) with 1 ml syringe (Terumo) was used to push the working fluids through the microchannel network. Additionally, we investigated the effect of the flow rate on the formation of the cell free layer.

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