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Shear induced diffusion in a red blood cell suspension THOMAS PODGORSKI, XAVIER GRANDCHAMP, APARNA SRIVASTAV, GWENNOU COUPIER, LIPhy, CNRS-UJF Grenoble — In the microcirculation, blood exhibits an inhomogeneous structure which results in the well know Fahraeus-Lindqvist effect : the apparent viscosity decreases when the diameter of the capillary decreases due to the formation of a marginal cell depletion layer (known as plasma skimming). This structure is a consequence of several phenomena, which include i) the migration of cells aways from walls due to lift forces and gradients of shear and ii) shear induced diffusion due to collisions and interactions among cells. We investigated these phenomena through experiments in simple shear and microchannel flows, with dilute suspensions of vesicles and blood cells. Pairwise interactions between suspended objects result in non-linear and flow-dependent diffusion, whose properties have been measured in different experiments for vesicles and blood cells. The injection of a sheet of concentrated blood cell suspension in a microchannel with a rectangular cross-section allows, through the measurement of its widening along the channel, to measure the diffusivity of blood cells, both in the local plane of shear and in the vorticity direction.

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