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Margination and demargination in confined multicomponent suspensions: a parametric study[1] MICHAEL GRAHAM, KUSHAL SINHA, RAFAEL HENRIQUEZ RIVERA, University of Wisconsin-Madison — Blood and other multicomponent suspensions display a segregation behavior in which different components are differentially distributed in the cross-stream direction during flow in a confined geometry such as an arteriole or a microfluidic device. In blood the platelets and leukocytes are strongly segregated to the near wall region and are said to be "marginated." The effects of particle size, shape and rigidity on segregation behavior in confined simple shear flow of binary suspensions are computationally investigated here. The results show that in a mixture of particles with same shape and different membrane rigidity, the stiffer particles marginate while the flexible particles demarginate, moving toward the center of the channel. In a mixture of particle with same membrane rigidity and different shape, particles with smaller aspect ratio marginate while those with higher aspect ratio demarginate. These results are consistent with theoretical arguments based on wall-induced migration and pair collision dynamics. An analytical solution is presented for a model problem that reveals qualitatively different behavior in various parameter regimes. Finally, effects of viscoelasticity of the suspending phase on margination are examined.

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