Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Hydrodynamic interactions between two vesicles PIERRE-YVES GIRES, Grenoble University, DYFCOM TEAM — A giant vesicle is a closed elastic membrane containing a liquid, inside another liquid. Its size is around 10 microns. If a suspension of such objects is sheared, they sometimes come close and interact hydrodynamically. We studied how these interactions affect the trajectories of the vesicles. For this, we model the properties of the membrane, assuming that the area of a surface element is constant in the course of time, and that it resists bending. We also assume that the inside and outside fluids are Newtonian, and are in the creeping regime. To solve the partial differential equations arising from this model, we used two methods : an asymptotic expansion around spherical shapes for vesicles far away from each other (3d case), and a boudary integral method (2d case). We find that vesicles repel, and that this repulsion decreases with initial transverse distance. We compare our results with experimental results performed with vesicles flowing in microfluidic devices.

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Date submitted: 19 Aug 2011 Electronic form version 1.4