

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Role of thermal fluctuations in vesicle dynamics KONSTANTIN TURITSYN, Los Alamos National Laboratory, SERGEY VERGELES, VLADIMIR LEBEDEV, Landau Institute for Theoretical Physics — Lipid bilayer vesicles can exhibit several regimes of motion when subjected to external flow: tumbling, tank-treading, trembling. Theoretical predictions based on deterministic models proved to be very successful in describing the corresponding phase diagram on qualitative level. However, recent experimental studies [Deschamps et.al., Phys.Rev.Lett. 178102 (2007)] identified significant quantitative discrepancies between theory and experiment, related mainly to the transition between tumbling and trembling regimes. Here we show that some of these discrepancies can be attributed to the role of thermal fluctuations. We extend the theoretical model to account for their effect. Fluctuations of the membrane give rise to effective compressibility, and lead to renormalization of its surface area. Resulting dynamical equations are still simple enough to be studied analytically and the resulting phase diagram is consistent with new experimental observations.

Konstantin Turitsyn
Los Alamos National Laboratory

Date submitted: 07 Aug 2009

Electronic form version 1.4