Abstract Submitted
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2D Brownian motion of inclusions in low pressure environment on freely suspended liquid crystal film[1] ZHIYUAN QI, CHEOL PARK, JOSEPH MACLENNAN, MATTHEW GLASER, NOEL CLARK, Department of Physics and LCMRC, University of Colorado, Boulder, Colorado, LC FILMS TEAM — The homogeneous freely suspended fluid SmA liquid crystal film of several nanometer thickness provides a very good system for studying 2D hydrodynamics. Using microscope and high-speed camera, we track the motion of inclusions of about 2-20μm in diameter that doing Brownian motion on the film. We report 2D Brownian motion experiment of drops in different air pressure environment. We found that at ambient pressure, the Hughes, Pailthorpe, and White (HPW) theory can perfectly predict the diffusion coefficient of those inclusions, while under low pressure when the mean free path of the air molecules is comparable with the size of inclusions, the HPW theory fails. We propose a model, based on freely diffused air molecules with Maxwell distribution, to explain the elevated diffusion coefficient in low pressure.

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