Abstract Submitted
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Lubrication theory applied to the Landau deGennes theory[1]
SOMESH BHATIA, DANA GRECOV, University of British Columbia — Liquid crystals (LCs) are anisotropic, viscoelastic materials with properties intermediate of solids and liquids. They are useful structural and functional materials; due to their ability to form ordered layers close to the bounding surfaces they are used as lubricants. The material properties and the behavior of LCs are dependent on the microstructure of the LCs which is affected by the strength of the applied hydrodynamic field and elastic effects of the bounding surfaces. Working towards the goal of studying thin films of LCs, the tensorial Landau de-Gennes theory is simplified using the Reynolds scaling approach. The solution of the fully coupled system of Navier-Stokes equations with a modified stress tensor which accounts for the viscoelastic contribution and the equations of Landau de-Gennes (LdG) theory was obtained on COMSOL Multiphysics^{TM}. The simplified equations from the derived lubrication theory were solved on MATLAB and the results were validated using a Couette flow by comparison with the simulations of the fully coupled system. As the LdG theory is a multiscale theory, the solution of the coupled system requires important computational resources. The advantage of the simplified equations of Lubrication theory is that it allows the reduction of study time.

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