Abstract Submitted
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Numerical study of non-linear dynamics of liquid lenses spreading over a viscoplastic liquid layer[1] CHRISTOS DRITSELIS, GEORGE KARAPETSAS, Dep. Chemical Engineering, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece — The present study is focused on the investigation of the dynamics of a droplet spreading over a viscoplastic fluid substrate. The Herschel-Bulkley model is utilised in order to account for the viscoplastic behaviour of the liquid subphase. A computational model is developed based on finite volume method while employing the volume of fluid method (VOF), which uses a volumetric phase fraction for each fluid phase and a continuum surface force model, to account for the multiphase nature of the system. The time and space discretization is performed by using second order accurate schemes. The present computational model is validated through comparisons with existing analytical and numerical solutions in the case of Newtonian liquids. The results of a thorough parametric study are presented and discussed, which include the impact of the rheological characteristics of the subphase, the layer depth and the effect of density and surface tension ratios between the three phases.

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