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Study of drop coalescence using the Lattice-Boltzmann Method
RICARDO FALLA AVILA, ANDRES GONZALEZ-MANCERA, Universidad de los Andes — Drop coalescence in an emulsion is studied using the Lattice-Boltzmann Method (LBM) to simulate multicomponent fluid flow in 3D. Two cases are considered, drop interaction under shear flow and interaction during gravity induced sedimentation. Several experimental results on the topic have already been published and computational studies using the Boundary Element Method (BEM) are also available, however, it is of interest to investigate how well does the LBM behaves in comparison with other methods. For shear flow, drop size ratios, interfacial properties and flow regimes, which favor coalescence, are identified and discussed. Multiple drops interactions under shear flow are demonstrated and characterized. The interaction of drops under gravity-induced sedimentation is also considered. In this case, the effects of drop size ratio, surface tension, gravitational pull and viscosity ratio on drop interaction and coalescence are studied. The results are then compared to those obtained using the traditional BEM and experimental data from the literature. Discussion on code implementation, as well as advantages and disadvantages of each method are highlighted.

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