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Thin sheet break-up in droplet-pool impact events[1] SHAHAB MIRJALILI, ALI MANI, Stanford University — Many experiment have shown that during the impact of a droplet of the size of a few millimeters on a pool of the same liquid with a velocity of a few meters per second, a thin sheet of gas is entrapped delaying the contact of the two liquid bodies. It has also been demonstrated that the break-up of this sheet, which happens in very small time scales, can lead to the generation of micro-bubbles. Given the very small scales involved, this problem is cumbersome to study numerically. In this work, we have undertaken this task by tackling the problem in 2-D. First, we use a relatively cheap boundary element simulation to find the evolution of the profiles prior to impact. After identifying the regimes of interest, and the relevant parameters and scales, diffuse interface CFD calculations are done and the process of sheet breakup and bubble generation is resolved via this approach. Parameter dependence studies are performed using these tools and statistics such as thin film thickness, length and micro-bubble distributions are presented. Finally, a linear stability analysis of thin gas sheet is performed and using the data from the two aforementioned approaches, thin gas sheet breakup is examined in the context of hydrodynamic instabilities.

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