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DIRECT NUMERICAL SIMULATIONS OF A SINGLE DROP IN BAG MODE BREAK-UP

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Abstract. Secondary break-up consist on the decomposition of droplets, ligaments and rims into smaller droplets forming a spray. This phenomenon is driven by interface deformation given by the growth of hydrodynamic instabilities, depending on Reynolds and Weber numbers. Bag mode break-up takes place at moderate gas Weber numbers, at which the drops turns into a film and inflates. Film thickness decreases until a hole forms and expands, giving place to decomposition in smaller droplets. This mechanism is present in several break-up processes and is of great interest to understand the underlying physics of liquid atomization. In this work, we present the Direct Numerical Simulations (DNS) results of a single liquid droplet submerged in an air stream in bag mode regime. Navier-Stokes equations for the two-phase flow are solved using a Volume of Fluid with a Piecewise Linear Interface Capturing (PLIC) formulation and geometrical advection schemes on the volume fraction and momentum equations, programmed in the Basilisk suite. The deformation of the drop into a film and the posterior evolution of its thickness is studied until the formation of a hole and the results are compared with experimental data.