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On the mechanisms of generation and pinch-off of bubbles and drops in high Reynolds number flows J.M. GORDILLO, Area de Mecanica de Fluidos, Universidad de Sevilla, Escuela Superior de Ingenieros, 41092, Sevilla, Spain, A. SEVILLA, Department of Applied Physics, University of Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands, J. RODRIGUEZ-RODRIGUEZ, Department of Mechanical and Aerospace Engineering, University of California, San Diego, 9500 Gilman Drive, La Jolla, CA 92093-0411, USA, C. MARTINEZ-BAZAN, Area de Mecanica de Fluidos, Universidad de Jaen, Campus de las Lagunillas, 23071, Jaen, Spain — It is well known that the formation of drops and bubbles in high Reynolds number flows can be described at early times in terms of Rayleigh (capillary) or Kelvin-Helmholtz (shear) instabilities. Our stability analyses and potential flow simulations have been employed to properly scale a large number of experimental measurements of the break-up frequency of drops and bubbles. The physics underlying above results, valid for the initial stages of the development of the instability, are also applicable near pinch-off and permit to clarify the different ways the minimum radius of drops and bubbles (hereafter denoted as r_n) approaches the finite time singularity. Thus, we recover the well known $r_n \propto \tau^{2/3}$, being τ the time to singularity, valid for drops, and show that in the case of bubbles, $r_n \propto \tau^{1/2}$ if the bubble break up is symmetric. However, we also show that if the break-up of bubbles is asymmetric the radius of the neck follows a $r_n \propto \tau^{1/3}$power law.

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