Abstract Submitted
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Direct numerical simulations of turbulent liquid jets[1] CRISTIAN RICARDO CONSTANTE AMORES, LYES KAHOUADJI , ASSEN BATCHVAROV, Imperial College London, SEUNGWON SHIN, Hongik University, JALEL CHERGUI, DAMIR JURIC, Laboratoire dInformatique pour la Mcanique et les Sciences de lIngnieur (LIMSI), OMAR K. MATAR, Imperial College London — The breakup of an interface into a cascade of droplets and their subsequent coalescence is a generic problem of central importance to a large number of industrial settings such as mixing, separations, and combustion. Therefore, it is unsurprising that the breakup of liquid jets during injection (i.e. atomisation) has received great scientific interest, and this is the focus of this study. We use a hybrid interface-tracking/level-set method to treat the surface tension forces of the Navier-Stokes equations in a three-dimensional Cartesian domain. A turbulent water jet is gradually injected through a cylindrical nozzle into the computational domain, which is filled with a stagnant viscous oil. The atomisation induces the formation of outer and inner lobes which film thickness reduces overtime to generate holes. Those holes expand radially driven by surface tension to form ligaments, and subsequently droplets. The formation of the lobes can be explained though through its vortex-surface interaction. A full parametric study is presented, and the relevant mechanisms underlying the flow phenomena are elucidated.

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