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Uncertainty Quantification on Entrapped Air in Droplet Impact Events[1] SEYEDSHAHABADDIN MIRJALILI, GIANLUCA IACCARINO, ALI MANI, Stanford University — Recent investigations have revealed that entrapment of air films under liquid-liquid impacts can lead to subsequent breakup processes forming many microbubbles per impact. In this work we consider a canonical setting in which individual liquid drops impact a deep flat pool as a model representative of this phenomena. We present an investigation of the uncertainty in the entrapped air associated with the angle of impact relative to the interface-normal direction. In practice, this uncertainty can be induced by surface waves or measurement errors; understanding this sensitivity might help in incorporating impact models as subgrid scale models in large-scale calculations. We have employed the direct numerical simulations of the Navier-Stokes equations in conjunction with a diffuse interface method to track the phase interface. For UQ analysis a quadrature-based and a regression-based non-intrusive polynomial chaos approach are compared. Using the same set of simulations, quadrature-based NIPC showed better convergence than regression-based NIPC. Our results indicate that even order 10 degree variability in the incident angle can lead to significant variability in the entrapped air film. Impact on various measures such as total entrapped volume and film thickness is discussed.

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