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Formulating a subgrid-scale breakup model for microbubble generation from interfacial collisions[1] WAI HONG RONALD CHAN, SHAHAB MIRJALILI, JAVIER URZAY, ALI MANI, PARVIZ MOIN, Stanford Univ — Multiphase flows often involve impact events that engender important effects like the generation of a myriad of tiny bubbles that are subsequently transported in large liquid bodies. These impact events are created by large-scale phenomena like breaking waves on ocean surfaces, and often involve the relative approach of liquid surfaces. This relative motion generates continuously shrinking length scales as the entrapped gas layer thins and eventually breaks up into microbubbles. The treatment of this disparity in length scales is computationally challenging. In this presentation, a framework is presented that addresses a subgrid-scale (SGS) model aimed at capturing the process of microbubble generation. This work sets up the components in an overarching volume-of-fluid (VoF) toolset and investigates the analytical foundations of an SGS model for describing the breakup of a thin air film trapped between two approaching water bodies in a physical regime corresponding to Mesler entrainment. Constituents of the SGS model, such as the identification of impact events and the accurate computation of the local characteristic curvature in a VoF-based architecture, and the treatment of the air layer breakup, are discussed and illustrated in simplified scenarios. Supported by ONR/A*STAR.

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