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Impact Detection for Characterization of Complex Multiphase Flows[1] WAI HONG RONALD CHAN, JAVIER URZAY, ALI MANI, PARVIZ MOIN, Stanford University — Multiphase flows often involve a wide range of impact events, such as liquid droplets impinging on a liquid pool or gas bubbles coalescing in a liquid medium. These events contribute to a myriad of large-scale phenomena, including breaking waves on ocean surfaces. As impacts between surfaces necessarily occur at isolated points, numerical simulations of impact events will require the resolution of molecular scales near the impact points for accurate modeling. This can be prohibitively expensive unless subgrid impact and breakup models are formulated to capture the effects of the interactions. The first step in a large-eddy simulation (LES) based computational methodology for complex multiphase flows like air-sea interactions requires effective detection of these impact events. The starting point of this work is a collision detection algorithm for structured grids on a coupled level set / volume of fluid (CLSVOF) solver (Mortazavi *et al.*, JFM 2016) adapted from an earlier algorithm for cloth animations (Bridson *et al.*, 2002) that triangulates the interface with the marching cubes method (Lorensen and Cline, Comp. Graphics 1987). We explore the extension of collision detection to a geometric VOF solver and to unstructured grids (Ivey and Moin, JCP 2015). Supported by ONR/A*STAR.

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