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Strategies for Multiphase Flows with High Density Ratios OLIVIER DESJARDINS, University of Colorado at Boulder, VINCENT MOUREAU, CORIA, France — While numerical methods for multiphase flows have progressed significantly in the past few years, simulating realistic flows with high density ratios remains a major hurdle, especially when combined with high shear, as encountered in air-blast atomization devices. In order to alleviate this issue in the context of level set methods, two strategies are investigated that aim at improving the consistency between level set and momentum transport. The first strategy relies on transporting an auxiliary density field created from the level set function and using it for creating consistent momentum fluxes. The second strategy relies on a two-velocity ghost fluid approach where both gas and liquid velocities are considered, allowing to decouple velocity gradients on each side of the phase-interface. Both approaches are shown to provide improved robustness and accuracy even in the presence of high density ratio and high shear. Advantages and limitations of these techniques are discussed for canonical two-phase flow configurations and for realistic fuel injection applications.

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