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A Numerical Method for Variable Surface Tension Effects in Non-Isothermal Atomization with Overset Grids[1] PETER BRADY, JUAN LOPEZ, MARCUS HERRMANN, Arizona State University — Overset grids lend themselves to problems requiring very high resolution in a region of the domain. Here we aim to couple an overset-grid method to our flow solver and interface tracking scheme for the purpose of high resolution atomization simulations. Often atomization occurs in non-isothermal environments, such as in combustion devices. In these devices, thermal fluctuations can be significant on length scales associated with the liquid atomization process. Since the surface tension force is a function of local temperature, these thermal fluctuations can result in large local variations of the surface tension force, thereby potentially significantly impacting the details of the atomization process. To handle these potentially large thermal fluctuations we introduce an overset grid in the vicinity of the interface. This allows us to resolve the complex thermal boundary layers that can develop without the expense of refining the flow solver grid. The Refined Level Set Grid (RLSG) method is used to track the liquid/gas phase interface using an auxiliary high resolution equidistant Cartesian grid. Verification tests using the method of manufactured solutions for multi-phase flow will be presented.

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