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Numerical Simulation of Cavitating Flows ASWIN GNANASKAN-DAN, KRISHNAN MAHESH, University of Minnesota — We are developing the capability to simulate cavitating flows (e.g sheet to cloud cavitation transition) in complex geometries. The compressible flow solver (Park & Mahesh, AIAA Paper 2007-0722) has been extended to solve for multiphase flows on unstructured meshes. A multi-phase medium is constructed using a homogenous equilibrium model that assumes thermal equilibrium between the liquid phase and the vapor phase. The algorithm solves the compressible Navier Stokes Equations for the liquid/vapor medium along with the transport equation for the liquid's mass fraction. A characteristic-based shock capturing scheme is extended to handle non-ideal gases and mixtures, and applied in a predictor-corrector approach. The base scheme is non-dissipative and this approach ensures that the shock-capturing is active only in the regions of discontinuity. We will present details of this algorithm, its implementation, and validation.

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