Interface-Sharpening Methods for Compressible Flow Problems

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Abstract: We will give a brief review of interface-sharpening methods for incompressible two-phase flow problems and then focus on two-types of differential techniques. One is based on solving an interface compression equation [cf. E. Olsson, G. Kreiss, A conservative level set method for two phase flow, J. Comput. Phys., 210 (2005), 225-246], and the other is based on solving an anti-diffusion equation [cf. K.K. So, X.Y. Hu, N.A. Adams, Anti-diffusion method for interface steepening in two-phase incompressible flow, J. Comput. Phys. 230 (2011), 5155-5177], that is performed in a fractional-step manner in the method after each advection time step of the numerical approximation of the underlying volume-fraction transport equation. Extension of these techniques to compressible flow with general equation of state will be discussed, and some preliminary results will be shown.

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