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High-order positivity-satisfying scheme for multi-component flows KHOSRO SHAHBAZI, South Dakota School of Mines and Technology — A high-order maximum-principle-satisfying scheme for the multi-component flow computations featuring jumps and discontinuities due to shock waves and phase interfaces is presented. The scheme is based on high-order weighted-essentially non-oscillatory (WENO) finite volume schemes and high-order limiters to ensure the maximum principle or positivity of the various field variables including the density, pressure, and order parameters identifying each phase. The two-component flow model considered besides the Euler equation of gas dynamics consists of advection of two parameters of the stiffened gas equation, characterizing each phase. The design of the high-order limiter is based on limiting the quadrature values of the density, pressure and order parameters reconstructed using a high-order WENO scheme. The convergence and the order of accuracy of the scheme is illustrated using the smooth isentropic vortex problem with very small density and pressure. The effectiveness and robustness of the scheme in computing the challenging problem of shock wave interaction with a cloud of bubbles tightly clustered and placed in a body of liquid is also demonstrated.

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