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**Expansion-compression motions in the single-mode Rayleigh-Taylor instability.** TENGFEI LUO, JIANCHUN WANG, SHIYI CHEN, Southern University of Science and Technology — In order to study the influence of compressibility on Rayleigh-Taylor (RT) instability, we used a high-order central compact finite difference scheme to numerically simulate the late-time evolution of two-dimensional single-mode compressible Rayleigh-Taylor instability for isothermal background stratification. The simulations were presented for different stratification strengths, corresponding to different isothermal Mach numbers ($M$) at Atwood numbers ($A_t$) 0.1 and 0.5. We studied the solenoidal component and compressible component of the velocity field employing the Helmholtz decomposition. At low Mach number, the expansion-compression motion is very weak and flow field is close to the incompressible state. For the case of $A_t$=0.1 and $M$=0.5, the rising light fluid expands and the falling heavy fluid is compressed, but the expansion and compression motions are weak. The expansion-compression motion at $A_t$=0.5 is significantly stronger than that at $A_t$=0.1 for the same Mach number $M$=0.5 in the mixing zone. The fluid outside the mixing zone also has stronger expansion and compression at $A_t$=0.5. The expansion motion inside the bubble can promote the development of the bubble.

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