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Numerical Study of Energy Conversion of the Taconis Oscillations in an Axisymmetric Closed Tube KATSUYA ISHII, Nagoya Univ, SHIZUKO ADACHI, Tokyo International Univ, HIROYUKI HAYASHI, Nagoya Univ — This paper studies spontaneous thermoacoustic oscillations of a helium gas in a closed cylindrical tube by solving the axisymmetric compressible Navier-Stokes equations. The wall temperature of the hot part near both ends (300K) and that of the cold central part (20K) are fixed. Numerical simulations are done for various values of the length ratio of the hot part to the cold part between 0.2 and 5.0. It is found that there are three groups of oscillation states, which are the fundamental mode and the second mode of a standing wave, and the oscillation with a shock wave. The states in each group have distinguished features of the vortical flow field and the temperature distribution. The evolution of the Lagrangian time derivative of entropy is analyzed to understand the energy conversion mechanism which maintains the nonlinear thermoacoustic oscillations.

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