Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Numerical Study of Thermoacoustic Spontaneous Oscillations in an Axisymmetric Closed Tube KATSUYA ISHII, ITC, Nagoya University, SHUN KITAGAWA, KOICHIRO SHIRAI, CSE, Nagoya University, SHIZUKO ADACHI, Tokyo International University — We study the stability of thermoacoustic spontaneous oscillations (Taconis oscillations) by numerically solving the axisymmetric compressible Navier-Stokes equations. The flow fields in a cylindrical closed tube are simulated by the block pentadiagonal scheme with the second–order time marching and the fourth-order convective term. We consider the helium gas in the closed tube with both hot end parts and a cold central part. When the temperature ratio is larger than the critical value, the spontaneous oscillation is observed. In the case of r(the length ratio of the hot part to the cold part)=1, we observe the fundamental mode of a standing wave as the spontaneous oscillation. On the other hand, in the case of $r < 0.42$ three different oscillation modes are observed: the fundamental mode and the second mode of a standing wave, and the oscillation with a shock wave.

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Date submitted: 01 Aug 2012 Electronic form version 1.4