AE682: Introduction to thermoacoustics
Project

In page 49 of the attached thesis, the stability of acoustic motions inside a Rijke tube powered by a heated wire mesh is analyzed. Using the method of spatial averaging, the author has arrived at eqns. 4.12 and 4.13 in the manuscript. Your objective is to solve this oscillator equation for acoustic pressure (p') and acoustic velocity (u') as given in eqns. 4.10 and 4.11. Take 10 modes (terms) in the series expansion of p' and u'. The model for damping incorporates both end losses and boundary layer losses and is given in eqn. 4.20. By adjusting the values of heater power k and damping ζ (to sensible values (positive heating and positive damping), obtain two cases where the solution is stable (oscillations die down) and unstable (oscillations grow to a limit cycle). Choose an appropriate value of initial condition, time delay (τ) to solve the equations. The solution scheme must at least use an integration scheme of 4th order accuracy (Runge-Kutta 4th order).

The deadline for the project is **November 30**

In your report, present the following:

1. Present plots of p' and u' for the case where Rijke tube is stable
2. Present plots of p' and u' for the case where Rijke tube is unstable
3. A brief report on the solutions obtained

The project is worth 40 marks