**DAVID AMUNDSEN**, Carleton University
*Standing waves in a partitioned tube with passive membrane*

The propagation of waves within a tube containing disparate gases separated by a passive membrane is modeled and analyzed in the limit of weak dissipation and applied forcing. This provides a simple setting in which to study the nonlinear interactions within and between each gas and provides a paradigm for other similar physical systems such as laminated elastic materials. The associated resonant frequencies are found in terms of a linear functional equation involving a non-trivial combination of the separate natural frequencies. As expected, in the limit that the gases have the same material properties, the modes become commensurate and the model reduces to that of the classical shock tube. However, sufficiently away from this limit it is seen that this structure is lost and smooth single mode resonant solutions arise.

Using a perturbative approach these solutions are approximated and compared to numerical solutions of the full system. The transition between smooth and discontinuous solutions is also studied both numerically and analytically, based on a dimensionless parameter associated with the relative material difference.