Stability Analysis of HEG Shot 1443

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Stability Analysis Parameters

- 7º Half-angle circular cone
  - 2.5mm-diameter nose radius, 1.0 m long
    - Grid uses 1215 x 350 cells, axi-symmetric

- Run Conditions
  - Velocity = 2507 m/s; Density = 17.5 g/m^3
  - Temperature = 293 K; Vibrational Temperature = 293 K*
  - Wall Temperature = 293 K; Mach 7.29
  - Mass Fractions: Based on Shot 1302
    - N2 = 0.7527; O2 = 0.2163; NO = 0.0307; O = 0.0003

- 5 species air assumed
  - Blended viscosity model based on Sutherland and Blottner data
  - Eucken relation for heat transfer
  - Reacting; Two-temperature non-equilibrium

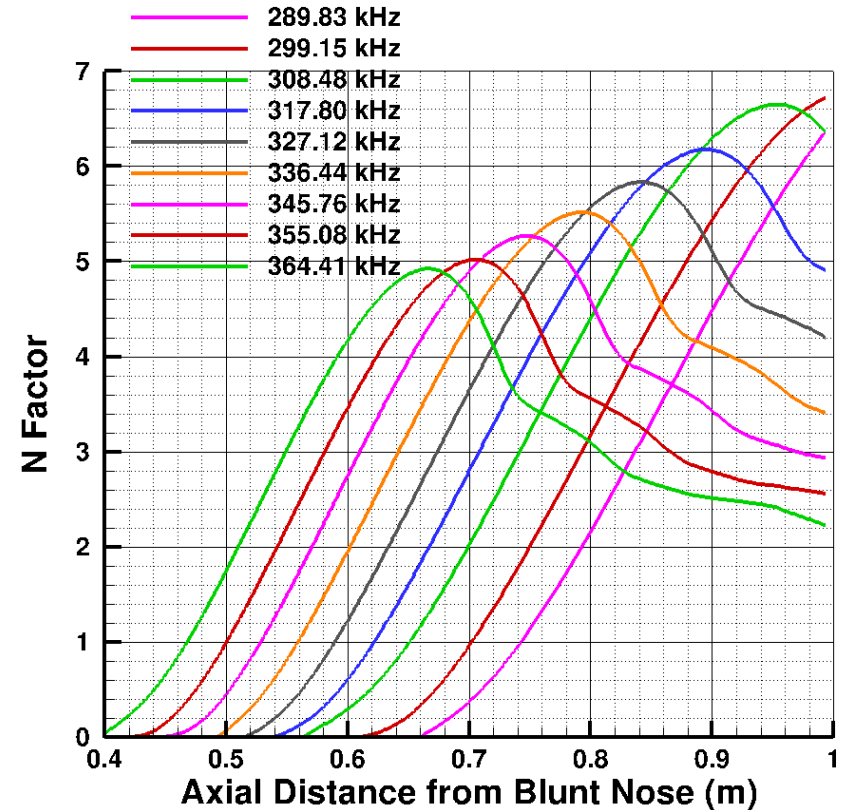***Assumed based on analysis of shot 1302**

N Factor

- ## Frequency Selection
  - Based on N factor around each sensor (0.632 m, 0.767 m, and 0.947 m)

- ## Transition onset
  - Estimated ~ 0.78 m from the nose (axial distance)
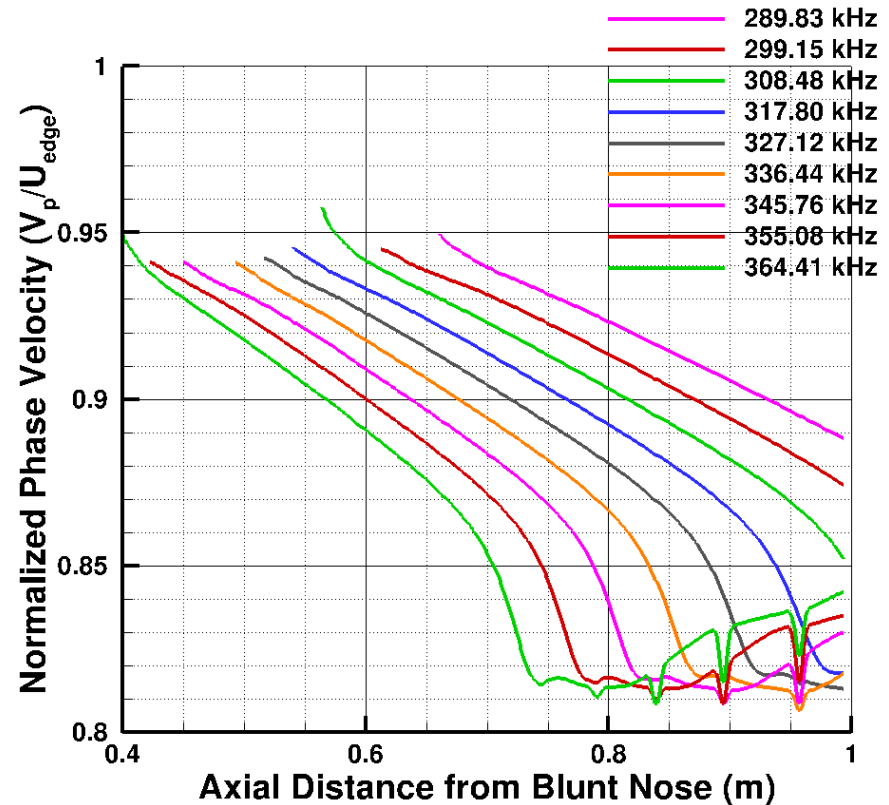

N factor versus axial distance

Normalize Phase Velocity

- ## Phase Velocity Variation
  - PSE based velocities calculated from STABL output data
  - Edge Velocity ~ 2444 m/s
  - Phase velocity varies between 0.95 and 0.81 across sensors

- ## Double check of math using STABL internal calculation from LST

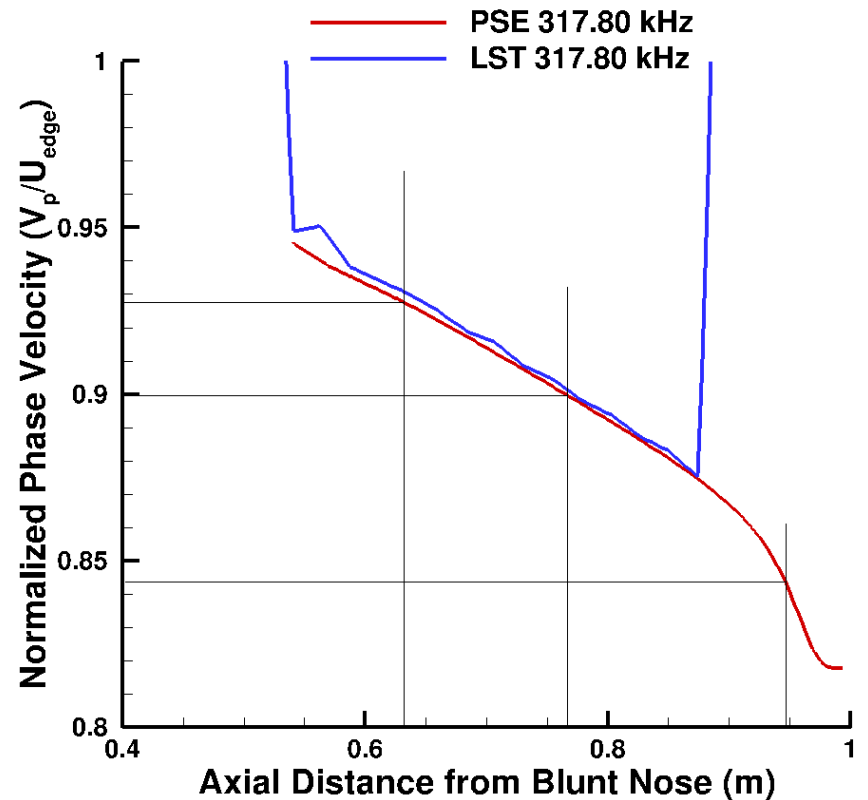**Phase Speed for Several Candidate Frequencies**

Normalize Phase Velocity

- **Phase Velocity Variation**
  - PSE based velocities calculated from STABL output data
  - Edge Velocity ~ 2444 m/s
  - Phase velocity varies between 0.95 and 0.81 across sensors

- **Double check of math using STABL internal calculation from LST**

Phase Speed of Selected Frequency