INTECOCIS Scientific Afternoon
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Numerical Slot Burner

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Slot Burner – Numerical Setup

Experimental Set up of the Slot Burner

Numerical Mesh
Slot Burner – Numerical Setup

• Direct Numerical Simulation with very high mesh resolution:
  – Flame front: 50 microns
  – Flame anch.: 10 microns
  – Acoustic BL: 100 microns
Slot Burner - FTF

T 50°
T 90°
T 120°
Slot Burner - FTF

- Temporal signals \((T = 50 \text{ degrees})\)
  - Inlet velocity & Top velocity (almost the same)
  - Heat release
Slot Burner – Flame Anchoring

T 50°

T 90°

T 120°

Heat Release

6.504e+09
4.872e+09
3.240e+09
1.608e+09
-2.441e+07
Slot Burner – Flame Anchoring

- Comparison between
  - Experimental visualization
    - OH/CH chemiluminescence
    - Photo multiplier
  - Numerical simulation data fields
    - Iso – Heat Release
    - Iso – species (reduced chemical schemes)

- Open problem...

\[
\text{Iso-HR} = 3.0 \times 10^9 \text{ W/m}^3
\]

\[
\text{Iso-HR} = 5.0 \times 10^9 \text{ W/m}^3
\]
Slot Burner – Flame Anchoring

Temperature gradient given by AVBP

Temperature

Imposed temperature

\[ T_s = 50 \]

\[ T_s = 90 \]

\[ T_s = 120 \]
Slot Burner – Flame Anchoring

- Pressure wiggles
Slot Burner – AVBP Fields

Grad $T$ mean

Grad $T$ prime

$T$ mean

$T$ prime max
Slot Burner – AVBP Fields

• Questions?