Fraunhofer experiment large scale combustion

- As one can see in [Gallego 2005], CFD codes have shown a certain difficulty in computing this experiment (although the flame speed is known).

- In [Beccantini 2007] it is shown that, if we perform a 1D point-symmetric computation, we correctly compute the pressure profile if the flame speed is correctly imposed.

- Recently in [Dellacherie 2009] it is shown that Godunov type solvers at low Mach regime does not work in 2D/3D but can work in 1D.

- $\Rightarrow$ Are failings shown in [Gallego 2005] due to the low Mach regime of the flow ?

Cylindrical flames computations

- In [Sedov 1959] and [Kuhl 1973], analytical solutions for 1D plane-, line- and point-symmetric constant speed flames are given.
- We propose to compute line-symmetric flames (2D flows).
  - Slow speed deflagration (Mach of the flame ≈ 0.05).
  - Fast speed deflagration (Mach of the flame ≈ 0.5).
  - Detonation.
  - (Slow) deflagration to detonation transition.
- Purpose: to evaluate our CFD code in computing combustion flows at all Mach regime.
- Finally, we propose to compute a slow deflagration to detonation transition inside a cylindrical shell with realistic mechanical properties, in order to investigate how the accuracy of the CFD computation affects the dynamic behaviour the mechanical device.

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