

## Solution of 2-D Euler Equations: Solid Rocket Motor

Spatial discretization schemes:

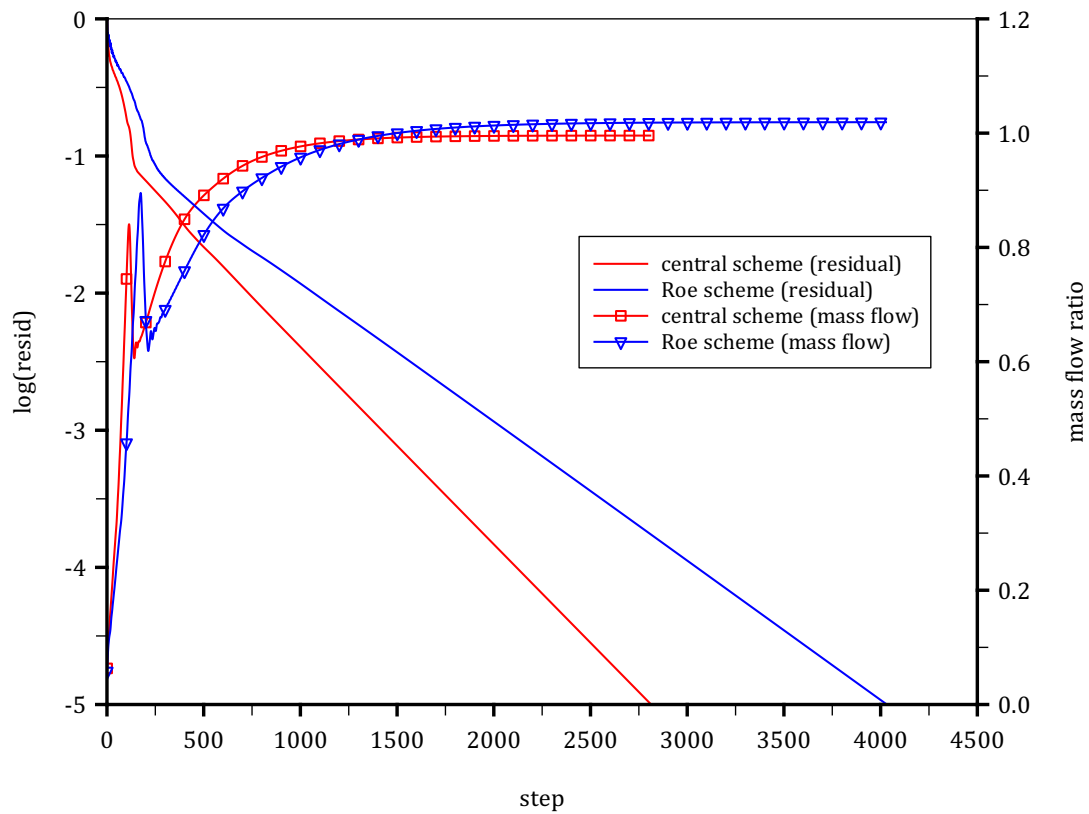
- Central scheme with scalar artificial dissipation:  
 $\sigma = 7.5, \varepsilon = 0.8, k^{(2)} = 0.5, k^{(4)} = 1/48$
- Roe's upwind scheme:  
 $\sigma = 5.0, \varepsilon = 1.0, K = 20$

Boundary conditions:

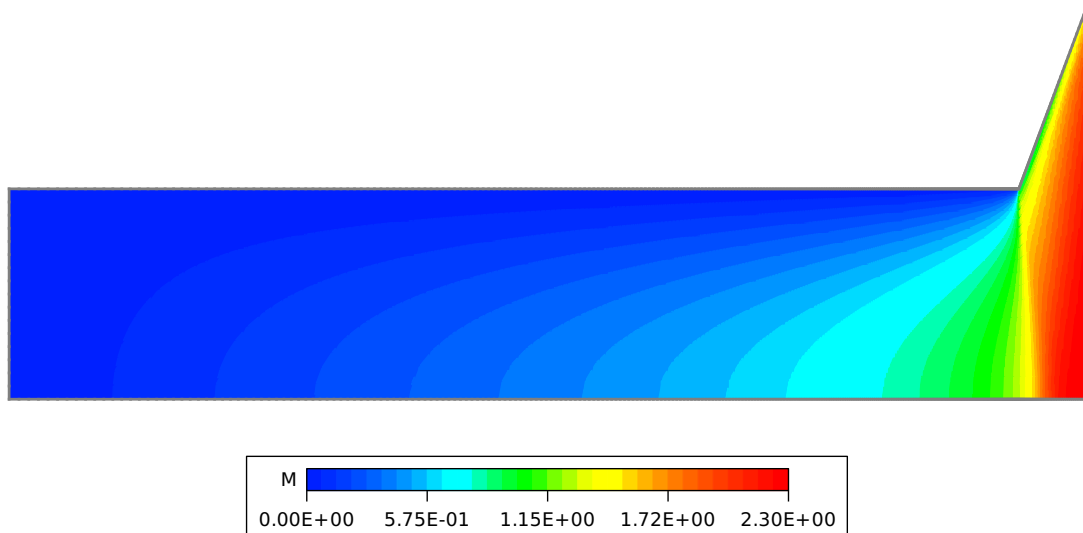
$$\dot{m}_{inj} = 13.0 \text{ kg/m}^2\text{s}, T_{inj} = 260.0 \text{ K}.$$

Reference:

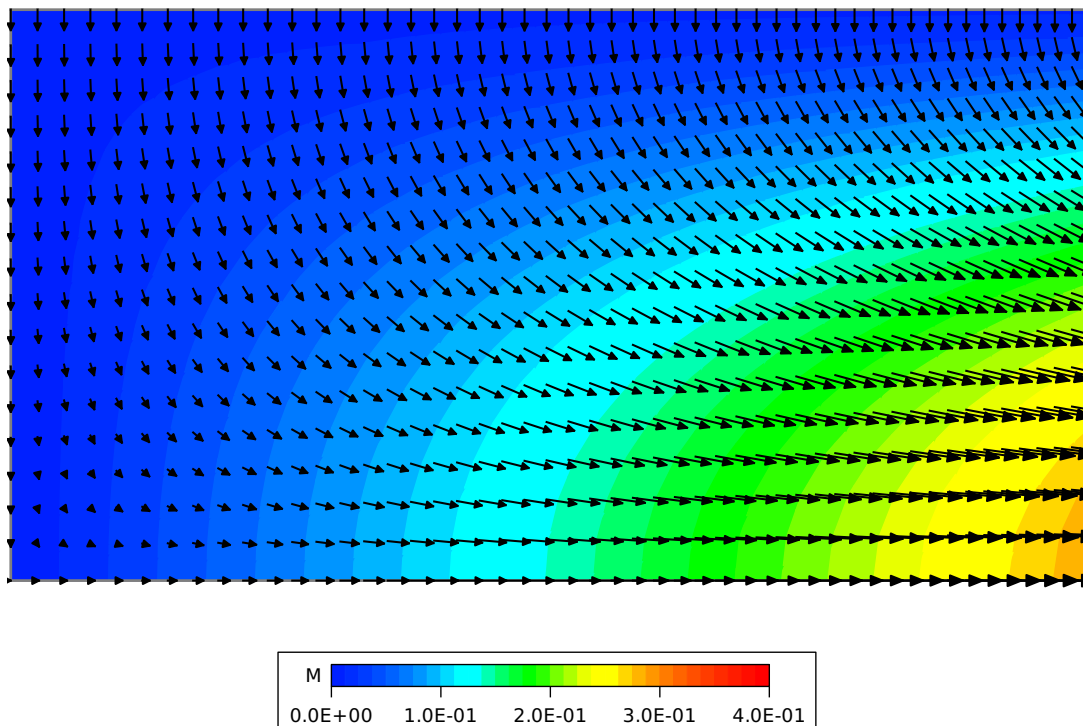
Traineau, J.-C.; Hervat, P.; Kuentzmann, P.: *Cold-Flow Simulation of a Two-Dimensional Nozzleless Solid Rocket Motor*. AIAA Paper 86-1447, 1986.



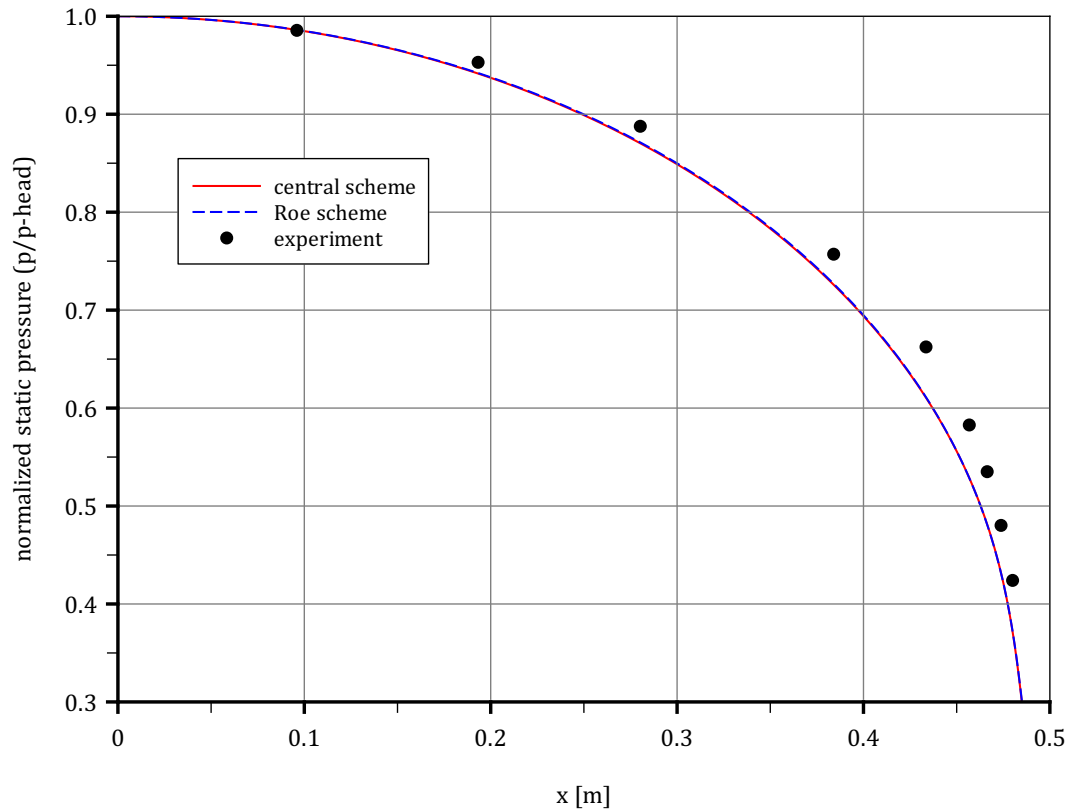
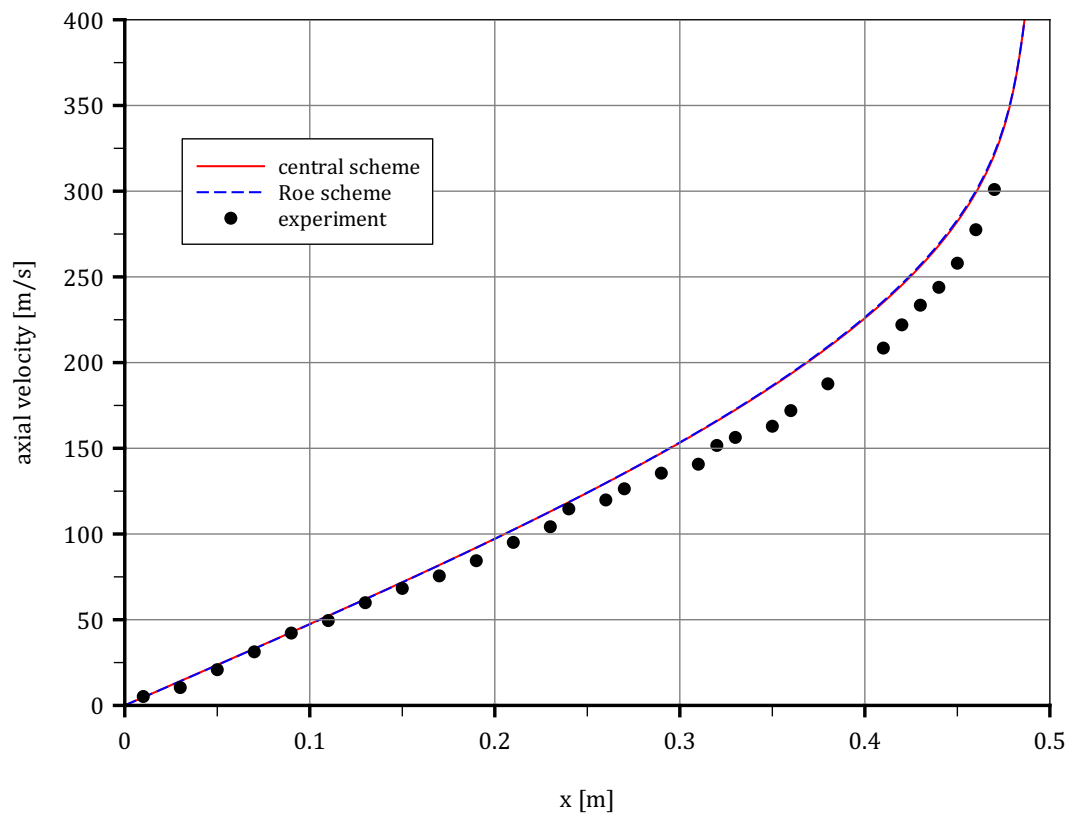
Convergence history.



Mach number distribution as computed by the Roe scheme (geometry scaled by factor 10 in the vertical direction).



Mach number distribution and velocity vectors at the head end as computed by the Roe scheme (scaled by factor 10 in the vertical direction).

Normalized static pressure ( $p/p_H$ ) over the axial distance.

Axial velocity at the centerline over the axial distance.