HOW CI1SHOCK CASE

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Background

- eddy implicit space-time entropy-stable flow solver
- Developed for unsteady scale-resolving flows
  - No expected efficiency or solver robustness for this case
- Full shock-capturing artificial viscosity details and current results outlined in AIAA 2017-4106

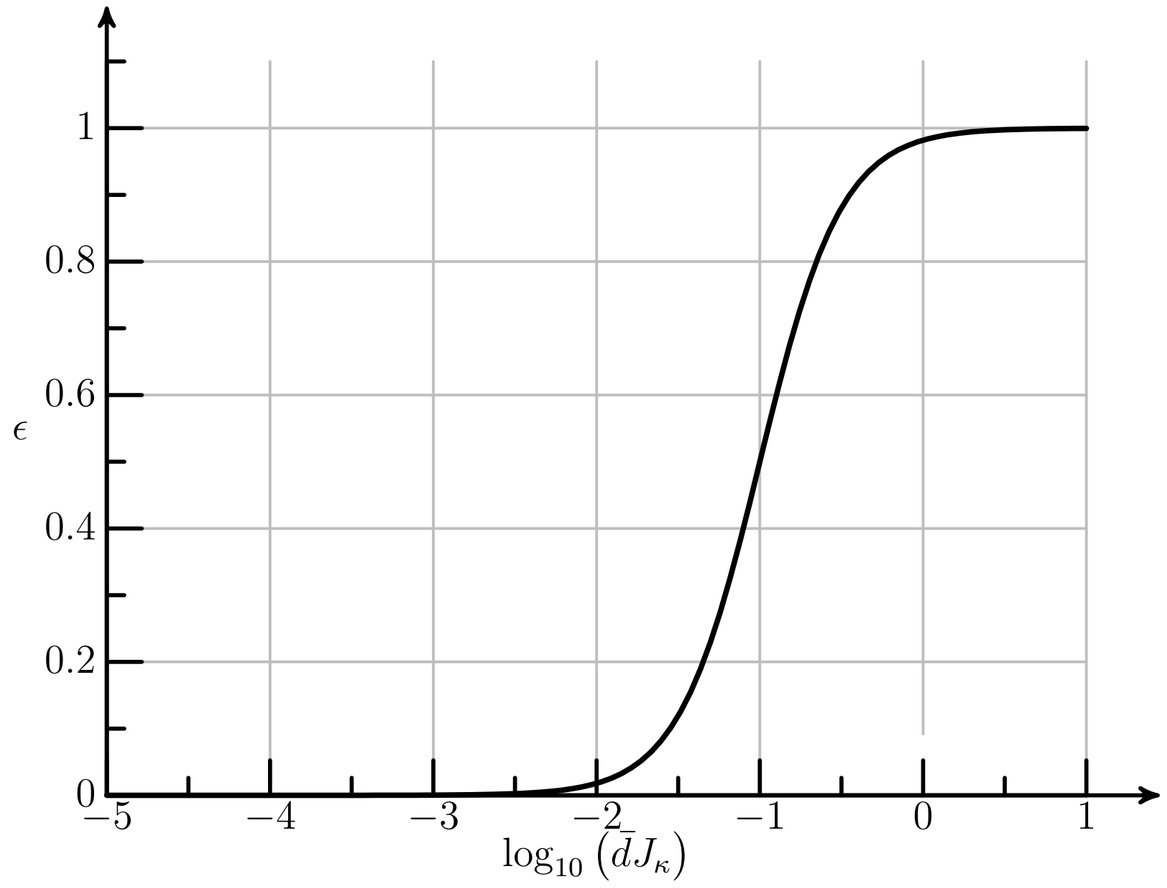
Functional Form

- Intentionally tune to provide a modest amount of artificial dissipation
- d is modified Ducros sensor

$$J_\kappa = \frac{1}{|\partial\kappa|}\int_{\partial\kappa}\left|\frac{[\![p]\!]}{\{p\}}\right|\cdot \boldsymbol{n} dS \quad = \begin{cases}\mathcal{O}\left(h^{p+1}\right), & \text{smooth}\\ \mathcal{O}\left(1\right), & \text{discontinuity}\end{cases}$$

$$\psi = \log_{10}\left(\bar{d}J_\kappa\right) + 1$$

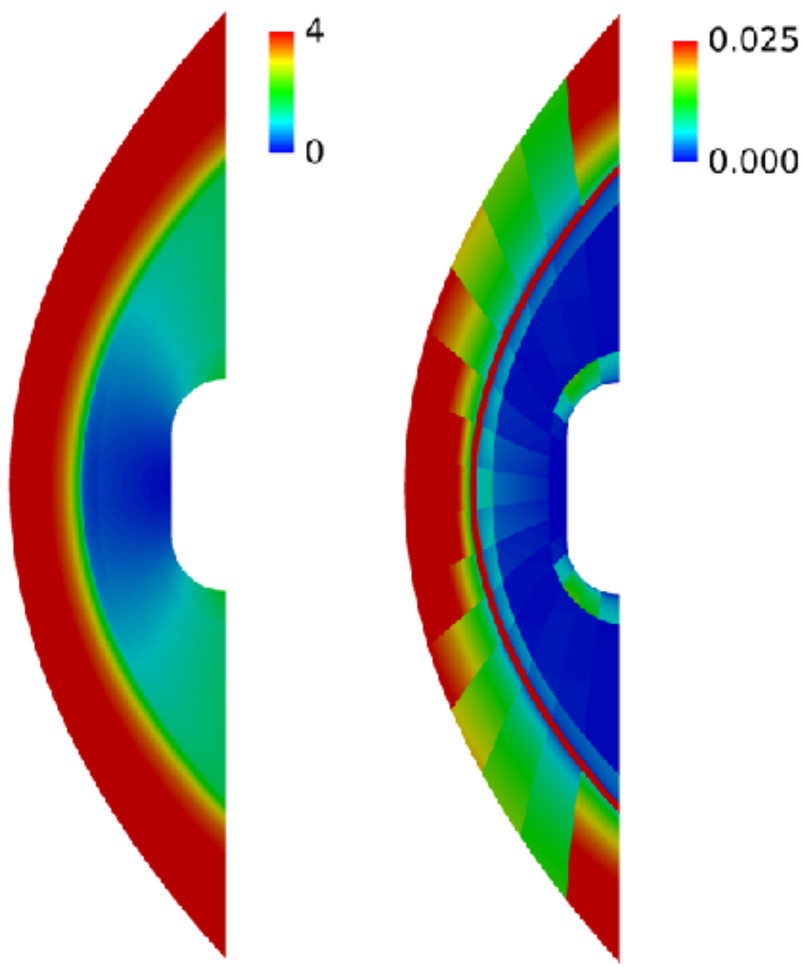
$$\epsilon = Re_h^{-1} = \frac{1}{2}\left[1+\tanh\left(2\psi\right)\right]$$



Supersonic Blunt Body

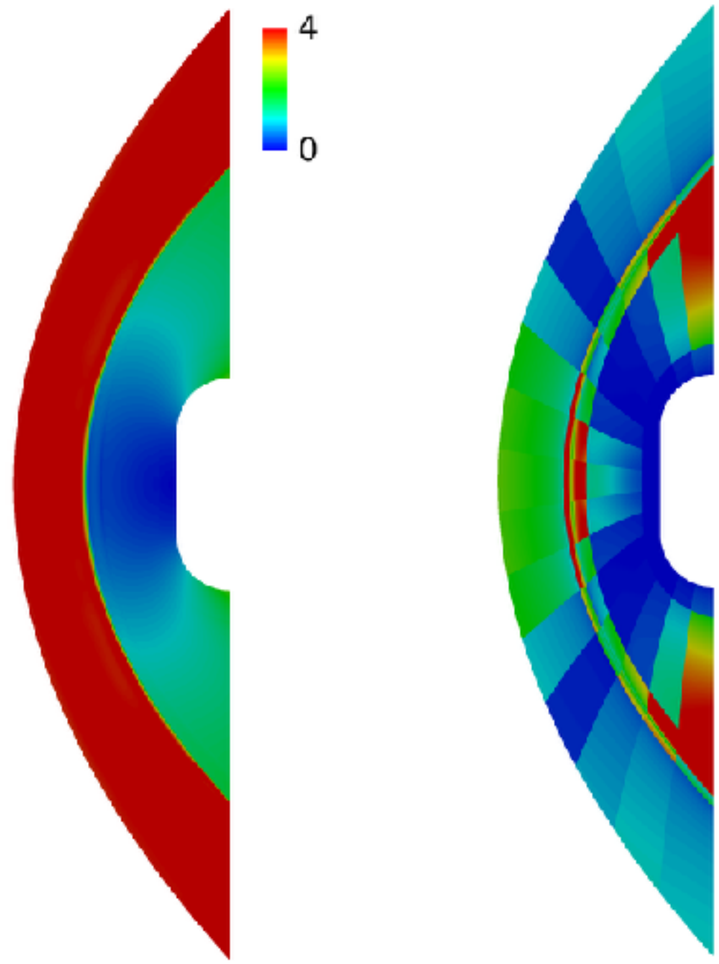
Ma = 4, Re=∞

N=2



Mach μ_s

N=4

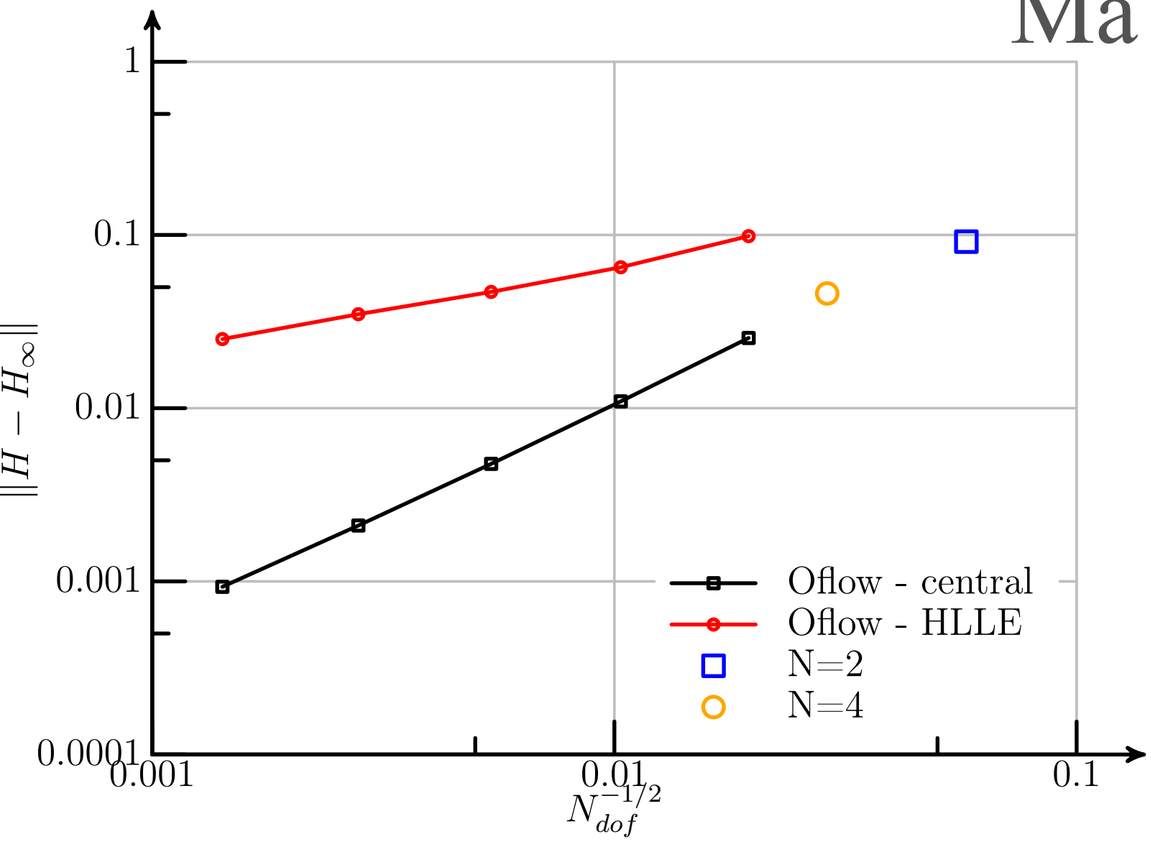


Mach μ_s

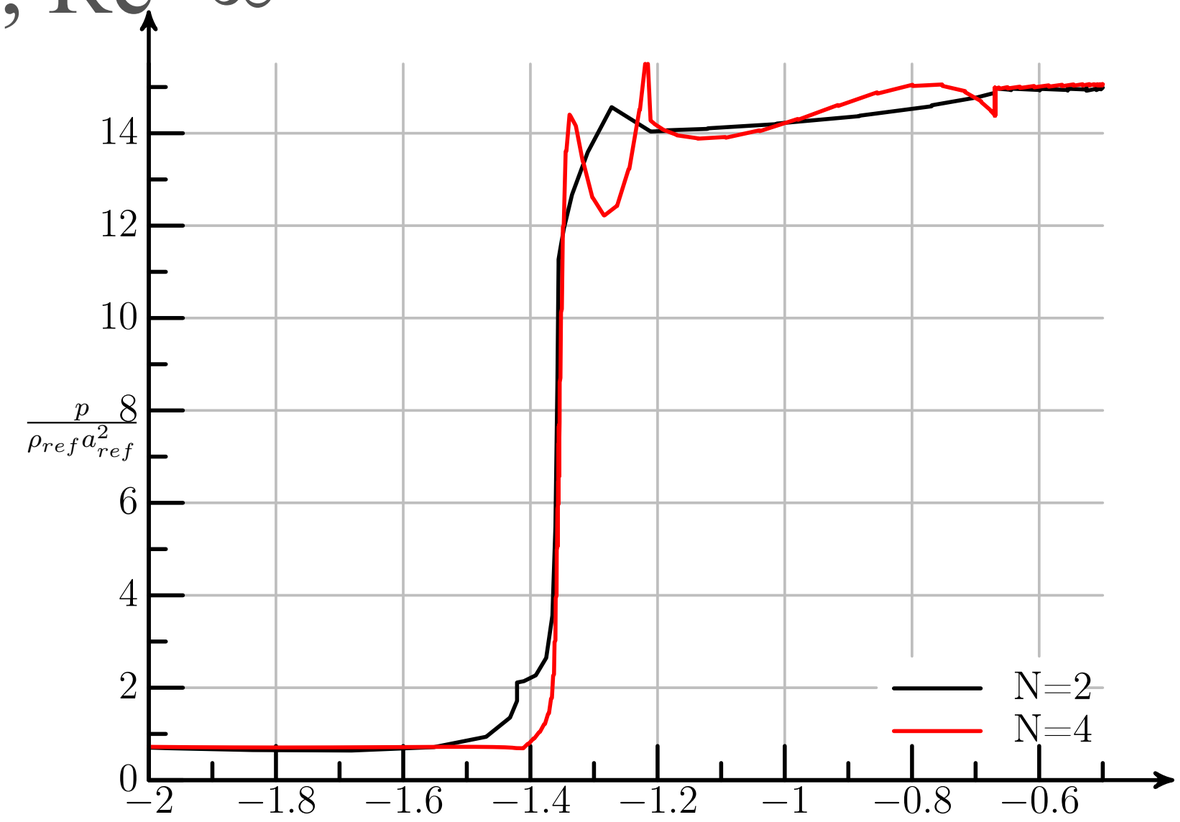
- 8th-order remained stable but did not converge to machine-epsilon

Supersonic Blunt Body

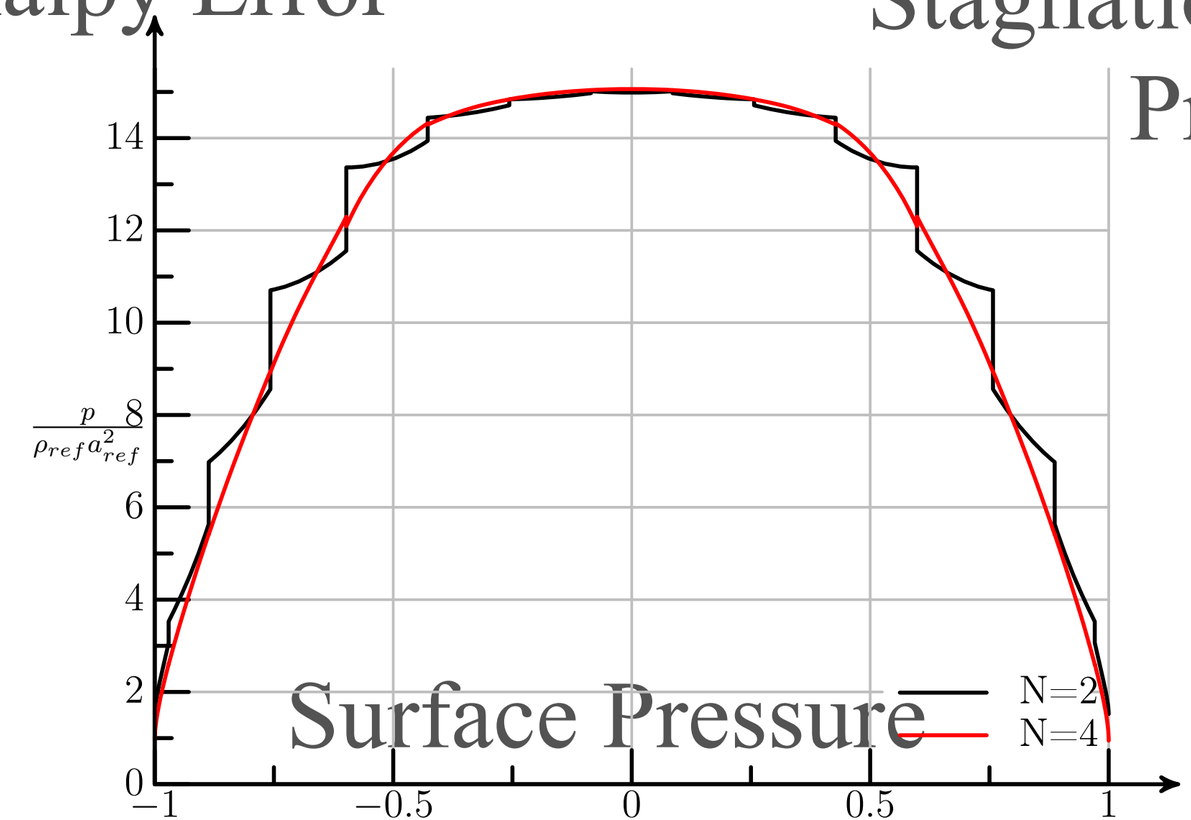
Ma = 4, Re=∞



Total Enthalpy Error



Stagnation Streamline Pressure



Surface Pressure