

Solution of 2-D Euler Equations: VKI-1 Turbine Blade

Spatial discretization schemes:

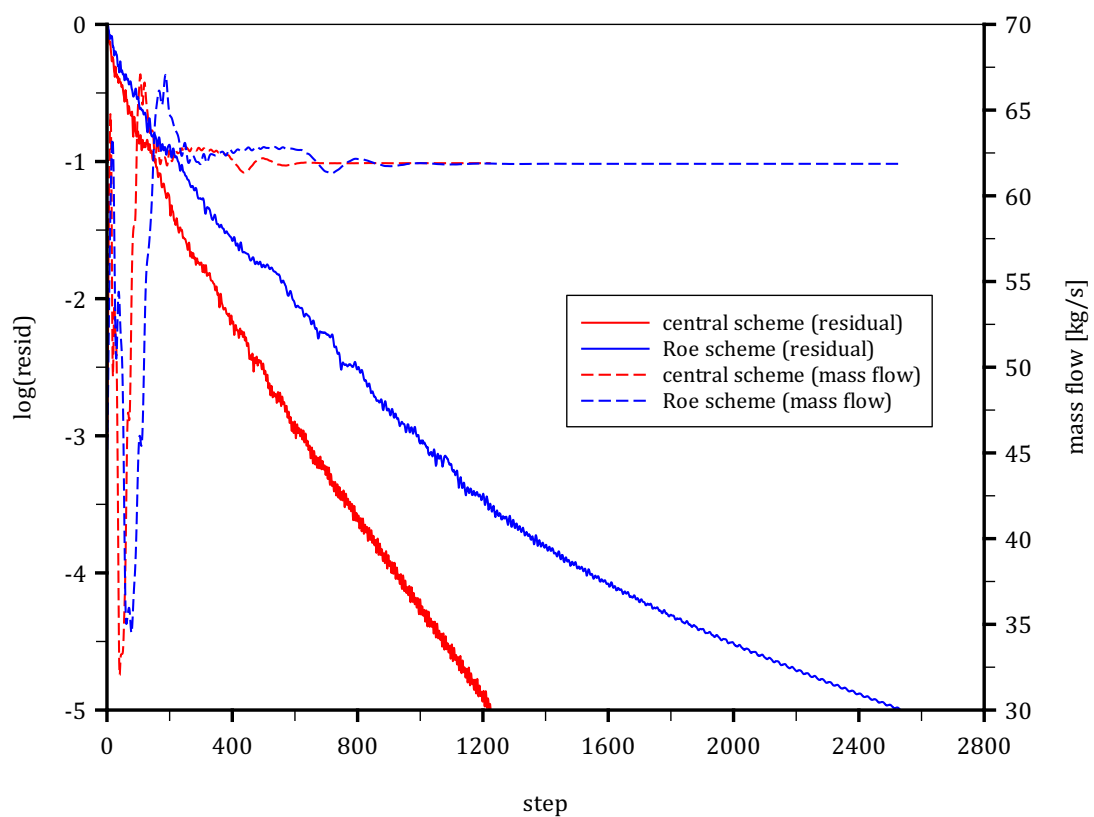
- Central scheme with scalar artificial dissipation:
 $\sigma = 7.5, \varepsilon = 0.8, k^{(2)} = 0.5, k^{(4)} = 1/128$
- Roe's upwind scheme:
 $\sigma = 5.0, \varepsilon = 1.5, K = 1.0$

Boundary conditions:

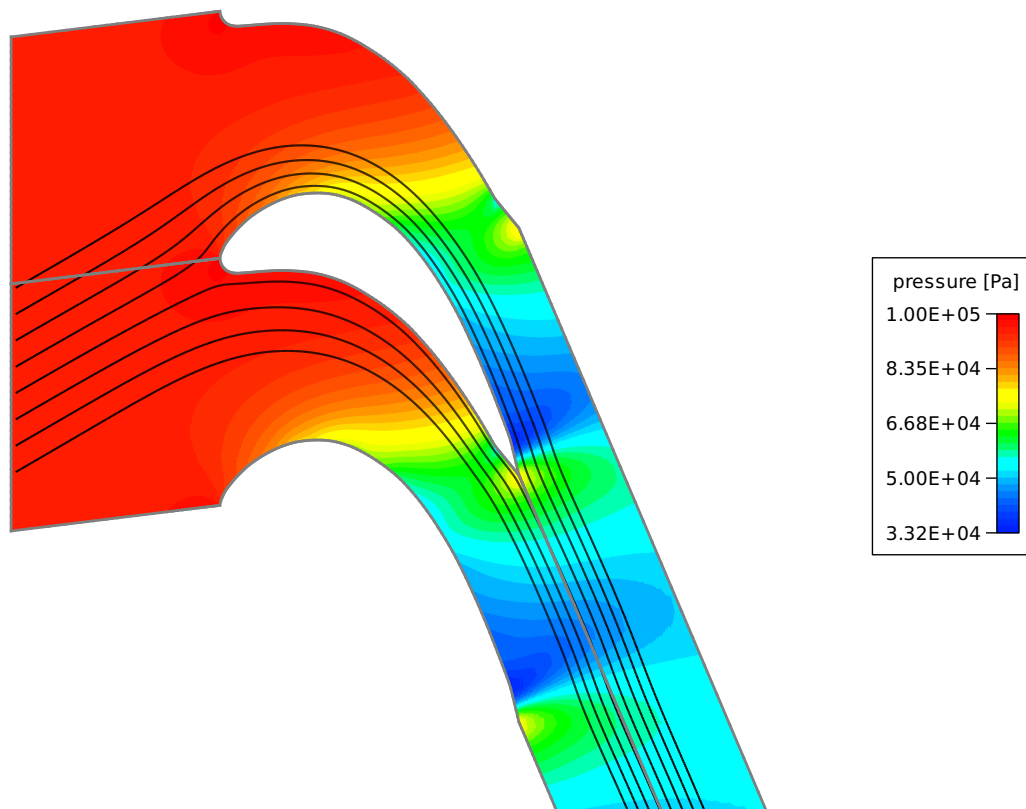
$$p_{t,inl} = 1.0 \cdot 10^5 \text{ Pa}, T_{t,inl} = 300.0 \text{ K}, \alpha_{inl} = 30^\circ, p_{out} = 5.283 \cdot 10^4 \text{ Pa}.$$

Reference:

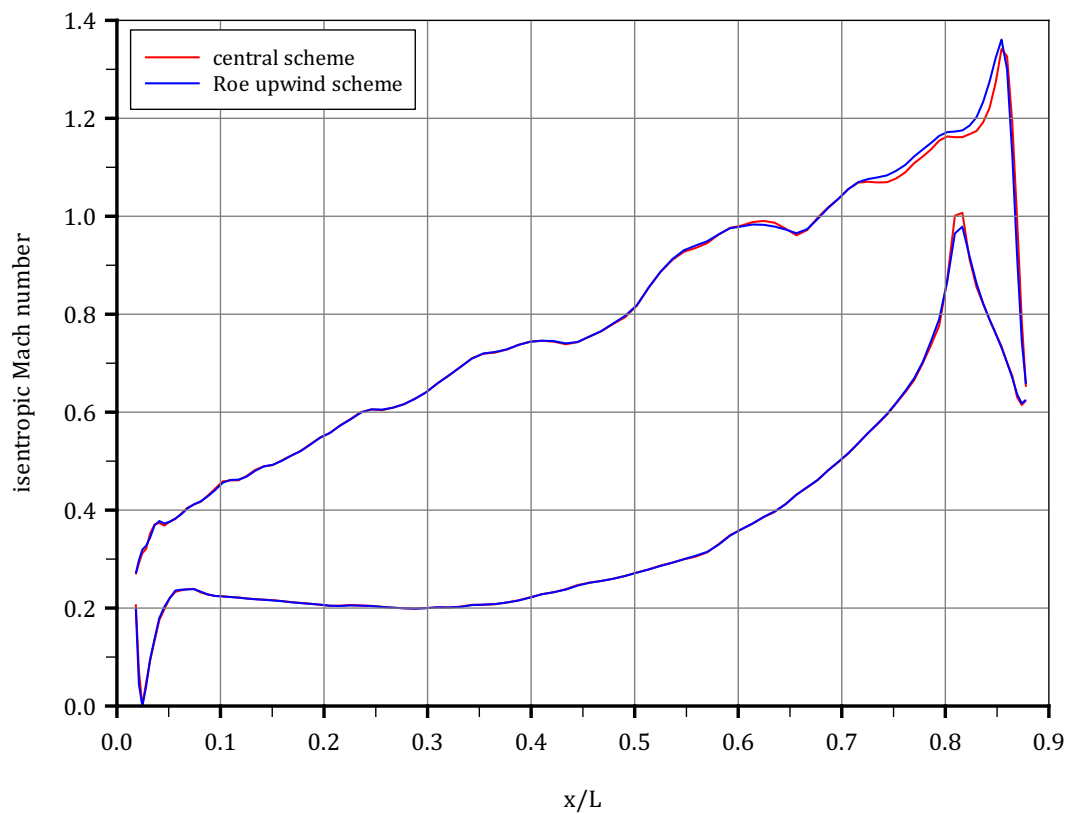
Kiock, R.; Lehthaus, F.; Baines, N.C.; Sieverding, C.H.: *The Transonic Flow Through a Plane Turbine Cascade as Measured in Four European Wind Tunnels*. ASME J. Engineering Gas Turbines and Power, 108 (1986), pp. 277-284.



Convergence history.



Pressure distribution and streamlines inside the cascade (Roe scheme).



Isentropic Mach number over the x-axis. Note that the waviness of the distribution on the suction side is caused by discontinuities of the surface curvature.