

Finite Volume and Finite Element Methods in CFD

(Numerical Simulation of Compressible Flow)

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(3 two-hour lectures)

- 1) *Fundamental laws and equations of fluid dynamics*: compressible Euler and Navier-Stokes equations
- 2) *Finite volume method for the Euler equations, combined finite volume - finite element method for the Navier-Stokes equations*: finite volume grids, derivation of schemes, numerical flux, boundary conditions, discretization of viscous terms by the finite element method, applications
- 3) *Discontinuous Galerkin finite element method*: derivation of the methods, example of implementation, time discretization, theoretical analysis, some important aspects - limiting, approximation of the boundary, examples of applications

Recommended literature:

M. Feistauer, J. Felcman, I. Straškraba: *Mathematical and Computational Methods for Compressible Flow*. Oxford University Press, Oxford, 2003, ISBN 0 19 850588 4