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Combined finite element–finite volume method (convergence analysis)

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Abstract: We present an efficient numerical method for solving viscous compressible fluid flows. The basic idea is to combine finite volume and finite element methods in an appropriate way. Thus nonlinear convective terms are discretized by the finite volume method over a finite volume mesh dual to a triangular grid. Diffusion terms are discretized by the conforming piecewise linear finite element method.
In the paper we study theoretical properties of this scheme for the scalar nonlinear convection-diffusion equation. We prove the convergence of the numerical solution to the exact solution.

Keywords: compressible Navier-Stokes equations, nonlinear convection-diffusion equation, finite volume schemes, finite element method, numerical integration, apriori estimates, convergence of the scheme
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