

# Energy conservation for the compressible Euler equations with possible vacuum

Emil Wiedemann

*Institute of Applied Mathematics, Leibniz Universität Hannover, Germany.  
wiedemann@ifam.uni-hannover.de*

## Abstract

The relation between regularity of solutions and conservation of energy is the subject of a famous (recently resolved) conjecture of Onsager, motivated from Kolmogorov's theory of turbulence in the context of incompressible flows. There has been a lot of recent activity to generalize Onsager's conjecture to a much wider class of models of hyperbolic type, but these results are usually restricted to nonlinearities with bounded second derivative with respect to the dependent variables. This, in particular, excludes the compressible Euler system with possible formation of vacuum for physically relevant adiabatic exponents. We show how Onsager-type statements can be derived for this degenerate situation nevertheless, developing techniques that go substantially beyond the classical commutator method. Joint work with I. Akramov (Hannover), T. Debiec (Warsaw), and J. Skipper (Hannover).

**Keywords:** compressible Euler equations, Onsager's conjecture, vacuum