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An Onsager Singularity Theorem for Solutions of the Compressible Euler Equations

We prove that any bounded weak solutions of the compressible Euler system satisfy kinetic energy, internal energy and entropy balance equations with possible 'inertial range' defect terms. These defects are non-vanishing only if the weak solutions have sufficiently low Besov regularity of the type observed empirically in compressible turbulence. Under some assumptions, we prove that these defects match on to the dissipative anomaly terms appearing in the inviscid limit for compressible Navier-Stokes solutions, thereby deriving Kolmogorov 4/5th–type laws. Stationary, planar shocks with an ideal-gas equation of state provide simple examples of dissipation solutions appearing in the inviscid limit and demonstrate the sharpness of our L^3 - based regularity conditions. This talk is based on joint work with Gregory Eyink.