A PROOF OF ONSAGERS CONJECTURE FOR THE INCOMPRESSIBLE EULER EQUATIONS

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In an effort to explain how anomalous dissipation of energy occurs in hydrodynamic turbulence, Onsager conjectured in 1949 that weak solutions to the incompressible Euler equations may violate the law of conservation of energy if their spatial regularity is below 1/3-Hölder. I will discuss a proof of this conjecture that shows that there are nonzero, $(1/3-\epsilon)$-Hölder Euler flows in 3D that have compact support in time. The construction is based on a method known as "convex integration," which has its origins in the work of Nash on isometric embeddings with low codimension and low regularity. A version of this method was first developed for the incompressible Euler equations by De Lellis and Székelyhidi to build Hölder-continuous Euler flows that fail to conserve energy, and was later improved by Isett and by Buckmaster-De Lellis-Székelyhidi to obtain further partial results towards Onsager's conjecture. The proof to be discussed of the full conjecture combines a new ingredient in the convex integration scheme due to Daneri-Székelyhidi with a new "gluing approximation" technique. The latter technique exploits a special structure in the linearization of the incompressible Euler equations.