

h-Principle and fluid dynamics

In the early nineties Scheffer produced a complicated example of a nontrivial weak solution to the incompressible Euler equations, having compactly supported in space and time. Subsequent papers by Shnirelman produced other examples of quite irregular solutions by different, yet complicated, methods.

In a recent joint work with László Székelyhidi we have used a suitable “*h*-principle” to produce solutions with the same behavior in a relatively simple way. Our approach answers to further questions left open by the works of Scheffer and Shnirelman and might be relevant in understanding a long-standing conjecture of Onsager. The same kind of analysis has surprising applications also to the theory of hyperbolic systems of conservation laws and shares some striking similarities with the theory of fully developed turbulence.