HÖLDER CONTINUOUS EULER FLOWS ON EUCLIDEAN SPACE

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Abstract

We will discuss the construction of compactly supported solutions to the three-dimensional incompressible Euler equations on $\mathbb{R} \times \mathbb{R}^3$ with Hölder exponent below $1/5$. This work (joint with Sung-Jin Oh) extends previous results of [Isett, 2012] to the nonperiodic setting. The main new difficulty we face is the requirement that angular momentum must be conserved for all finite energy solutions to the Euler equations.

We introduce several improvements in the construction to address this difficulty which lead to a simpler iteration framework with dimensionally correct estimates. Our main innovation is a construction of explicit compactly supported, symmetric tensors which solve the divergence equation $\partial_j R^{jl} = U^l$ for any given vector field orthogonal to translation and rotation vector fields. We will also discuss improvements of our main result, which can be viewed as first steps towards a strengthening of Onsager’s conjecture proposed in [Isett, 2013] within the range of exponents below $1/5$. 