

1096-76-1913

Gautam Iyer*, Dept. of Math-Sci, Carnegie Mellon University, Pittsburgh, PA 15206, and
Alexander Kiselev and **Xiaoqian Xu**. *Lower bounds on the mix norm of passive scalars
advected by incompressible enstrophy-constrained flows.*

Consider an diffusion-free passive scalar θ being mixed by an incompressible flow u on the torus \mathbb{T}^d . Our aim is to study how well this scalar can be mixed under an enstrophy constraint on the advecting velocity field. Our main result shows that the mix-norm ($\|\theta(t)\|_{H^{-d/2}}$) is bounded below by an exponential function of time. The exponential decay rate is morally the measure of the support of the initial data, and agrees with both physical intuition and numerical simulations. The main idea behind our proof is to use the notion of “mixed to scale δ ” and recent work of Crippa and DeLellis towards the proof of Bressan’s rearrangement cost conjecture. (Received September 16, 2013)