Residual diffusion for fluid flows

Bill Cooperman

There have recently been many results which prove passive scalar mixing and enhanced dissipation for various velocity fields on the torus. Such results imply that the law of a particle, advected by some "chaotic" velocity with a small Brownian noise, converges to the uniform probability measure at an exponential rate independent of the noise parameter. One may view this phenomenon as an amplification of the noise by the noncommutative interaction with the advection term. I will discuss residual diffusion, a similar kind of "noise amplification" on the whole Euclidean space, instead of the torus.