Some results and problems on advection-diffusion equations

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Abstract. We will present some recent results by the author and his collaborators concerning (scalar) advection-diffusion equations in \mathbb{R}^n , with initial data in L^p for some $1 \leq p < \infty$. In particular, we will show how to obtain very general decay estimates using an iterative technique similar to Moser iteration used in elliptic problems. If time allows, we will also briefly discuss some related results concerning the 3-D incompressible Navier-Stokes equations in fluid dynamics.