A quantitative theory for transport equations

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In this talk I will present a quantitative approach to transport equations based on tools from the theory of optimal transportation. More precisely, I will derive sharp bounds on Kantorovich-Rubinstein distances which allow to study the optimal rates at which fluids can be mixed by stirring. I will furthermore describe how these bounds can be applied to show well-posedness of transport equations with Sobolev vector fields directly without using the theory of renormalized solutions.