北京理工大學

数学与统计学院学术报告

On the Mixing Properties of 2D Incompressible Steady Flows

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时 间：2026年11月26日（星期四）16:00--17:00

地 点：文萃楼E708

摘 要： Mixing creates fine spatial structures through transport, yet different measures of mixing capture distinct aspects of this process. In this talk, we study two-dimensional stationary incompressible flows and connect three quantitative observables: decay in the negative Sobolev norm, the mixing scale of transported sets, and the growth of Lipschitz curves. Because stationary Hamiltonian flows preserve individual streamlines, the appropriate limiting scalar profile is generally its orbit average rather than its global spatial mean. The common mechanism is differential rotation: variation of the orbit period produces transverse shear between neighboring periodic trajectories. Under suitable regularity and nondegeneracy assumptions, we establish sharp decay towards the orbit average in H^{−1}, together with a matching decay law for an orbit-relative geometric mixing scale. We also derive a first-order expansion for the length of transported Lipschitz curves. A shared shear mechanism links these observables, while their precise estimates require distinct analytic and geometric arguments.

个人简介：张与彪，吉林大学数学学院应用数学系教授、博士生导师，主要从事分布参数系统控制，控制理论与机器学习交叉等方向的研究，主持国家自然科学基金青年、面上项目及洪堡项目，成果发表于ARMA、JMPA、JEMS、SICON等控制领域顶刊，著有专著《Time Optimal Control of Evolution Equations》，2026年获国家天元数学东北中心优秀青年学者。

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